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THE PROOFS OF THE EXISTENCE OF A PHTHISICAL CONTAGION.

BY

R. SHINGLETON SMITH, M.D., B.Sc., M.R.C.P.,

Physician to the Bristol Royal Infirmary,
and Lecturer on Physiology in the Bristol Medical School.

THE contagiousness of tuberculosis is a subject of peculiar interest to the medical profession of this district, inasmuch as it was here that our late colleague, Dr. Wm. Budd, startled the profession by announcing his belief that phthisis would be found to be contagious. The grounds of his belief were as follows:—*

(*a*) Considerations based on the pathology of phthisis, as showing it to consist in the evolution and multiplication within the organism of a specific morbid matter, with a universal tendency to elimination and casting forth of the same, after the type of zymotic diseases generally.

(*b*) Actual instances in which there was evidence to show that phthisis was communicated from one person to another.

(*c*) The geographical distribution of phthisis in past

* *Lancet*, Vol. II., 1867, pp. 451—550.

and present times, and especially its great fatality now in countries which, when first discovered by Europeans, were known to be entirely free from it.

(*d*) Its much greater prevalence in low levels and amongst crowded communities, and its entire absence, unless by casual importation, at very high levels,—conditions which are well known to rule in the same directions the spread of zymotic diseases generally, and especially in that group in which, as in phthisis, the morbific matter is cast off in a liquid form.

(*e*) Its very high rate of prevalence in convents, harems, barracks, penitentiaries, &c., that is to say, under the very social conditions which are known most to favour the propagation of diseases of the zymotic group.

Among the data relating to geographical distribution the following striking facts may be here mentioned:—

1. When the South Sea Islands were first discovered phthisis did not exist there. Since the aborigines have come into intimate contact with Europeans the disease has not only made its appearance among them, but has become so wide-spread as to threaten their extermination. The contrast between the original entire immunity and the present extreme fatality is very striking, and can only be rationally explained by the importation of a new and specific morbific germ. Try every other supposition and the facts are inexplicable; make this one supposition and they are at once explained.

2. The late Dr. Rush, of Philadelphia, who made very accurate enquiries to determine the point, satisfied himself that when America was first discovered phthisis was unknown among the native American Indians. Now it is very fatal to them. The very significant contrast here exhibited between the past and present history of these

two races, in respect of phthisis, is seen at once, and at the present time among the negro race in Africa in different parts of the area of that great continent.

It is well known that negroes are peculiarly liable to phthisis. Now everywhere along the African seaboard where the blacks have come into constant and intimate relations with the whites, phthisis causes a large mortality amongst them. In the interior, where intercourse with the whites has been limited to casual contact with a few great travellers or other adventurous visitors, there is reason to believe that phthisis does not exist. Dr. Livingstone and other African travellers have given us the most positive assurances on this point.

The following are the principal conclusions to which I have been led regarding phthisis or tubercle:—

1st.—That tubercle is a true zymotic disease, of specific nature, in the same sense as typhoid fever, scarlet fever, typhus, syphilis, &c.

2nd.—That, like these diseases, tubercle never originates spontaneously, but is perpetuated solely by the law of continuous succession.

3rd.—That the tuberculous matter itself is (or includes) the specific morbific matter of the disease, and constitutes the material by which phthisis is propagated from one person to another, and disseminated through society.

4th.—That the deposits of this matter are therefore of the nature of an eruption, and bear the same relation to the disease phthisis as the "yellow matter" of typhoid fever for instance bears to typhoid fever.

5th.—That by the destruction of this matter on its issue from the body, by means of proper chemicals or otherwise, seconded by good sanitary conditions, there is reason to hope that we may eventually, and possibly at

no very distant date, rid ourselves entirely of this fatal scourge.

In support of Dr. Budd's statement with regard to the geographical distribution of the disease, De Quatrefages in his work on "The Human Species" says:—"In the Sandwich Islands Cook calculated the population at 300,000. In 1861 there were but 67,084. Similar facts are true of most other parts of Polynesia.

"Two naval surgeons have been able to throw light on this melancholy problem. They found that tubercles were invariably found in the bodies submitted to examination. Almost all the Polynesians suffer from an obstinate cough, and in eight cases out of ten tuberculosis follows these bronchial catarrhs.

"Now phthisis does not appear in the list of diseases drawn up by the old voyagers. Have we then imported it into these islands? Developing in a new region, in a race to whom it was formerly unkown, this disease assumed a more terrible form."

The researches of later times have given much support to a view which has long existed in a smouldering unstable condition. The most recent discovery, that of Professor Koch, of a definite distinguishing bacillus of characteristic form and size, found in tubercular matter in the body and in tuberculous excreta, capable of being inoculated, capable also of purification by successive growths by a process of artificial cultivation, these facts have given new life to an idea which appeared to be almost dead, have given an impetus to the doctrine of contagium vivum which is not likely to be short lived.

Even as long ago as the times of Galen consumption was supposed to be contagious, and antiseptic treatment of a primitive kind was first attempted when Galen

ordered his patients to inhale the sulphurous and other exhalations from the crater of Etna.

It is only about twenty years ago that Buhl began to teach, apparently as a new idea, that acute tuberculosis is of an infective nature, the disseminated grey granulations being supposed to be the result of absorption of some poisonous material from a caseous focus originating in some inflammatory or scrofulous action.

Experimental Evidence.—Villemin, in 1865, demonstrated the possibility of inoculating animals with tuberculosis. He found the disease could be readily induced in dogs and rabbits by the inoculation of little bits of tubercle inserted under the skin. Hypodermic injection of small quantities of the sputa of consumptive patients gave the same result.

Villemin's* experiments showed conclusively the possibility of inoculating tubercle from men to the lower animals, and from one animal to another. These results were fully corroborated by Simon,† who found that both the yellow and the grey tubercle are inoculable from man to the rabbit, and from rabbit to rabbit. He concluded that whether it be called tubercle or not the action must be allowed to be specific. A commission of inquiry appointed by the Pathological Society of London to report on Simon's specimens "thought the tuberculous nature of the specimens was beyond reasonable doubt." So also a French commission gave Villemin credit for revealing a fact of the highest interest, the transmission of phthisis by the inoculation of tuberculous matter. Bizzozero, Colin, Biffi, and Mantegazza have confirmed these results, and satisfied themselves that the growths in the viscera

* Villemin—*Lancet*, I., 1867, p. 582, 641; II., 1867, p. 774.

† Simon—*Lancet*, I., 1867, p. 367.

of rabbits inoculated with human tubercle are really tubercles.

The researches of Villemin and Cohnheim established the fact that true tubercle may always be inoculated, and this became established as the test by which true and false tubercle might be differentiated. The capacity of a morbid product, when introduced into the body of a rabbit or a guinea pig, to produce tuberculosis in the animal demonstrates the nature of that morbid product: what produces tuberculosis is tubercle, what fails to produce tuberculosis is no tubercle. The following paragraph, written in May, 1880,* is quite prophetic of recent discoveries:—"Those who are convinced that all contagious virus is due to a parasite will, of course, not hesitate to believe that the tubercular poison is corpuscular, and that, in a not very distant future, this corpuscle will be demonstrated in the tuberclenodule and in scrofulous products. Until, however, this goal is reached there remains no other test for tubercle than that of infection." The writer of this paragraph scarcely suspected that in two years afterwards the examination of sputum in order to establish the diagnosis of phthisis by ocular inspection of the Bacillus tuberculosus would be an every-day occurrence in the wards.

Then came the experiments of Lebert, Burdon-Sanderson, Andrew Clark, Wilson Fox and others, who at first appeared to establish the fact that what was called tuberculosis in animals might be produced by the inoculation, not of true tubercle only, but of any of the products of inflammatory action, or even of putrid substances or by foreign bodies such as a seton. Doubts were thus thrown on the nature of tubercle itself, and it appeared to be

* *Brit. Med. Jour.*, p. 704.

difficult to say what might be true and what pseudo tubercle—the barrier between inflammatory action and a specific tuberculosis appeared to be giving way, and so it got to be assumed that most of the changes going on in the lungs in phthisis were of an inflammatory nature, and that the rôle of the specific substance, the grey granulation, was far more limited than had been supposed. The experiments of Dr. Hippolyte Martin, of Paris, caused a swing of the pendulum in the opposite direction, and appeared to re-establish the existence of a specific virus without which tuberculosis could not be produced.*

Dr. Martin conducted two sets of experiments to prove the infectiousness of tubercle. With the greatest antiseptic precautions he injected into the peritoneal cavity of guinea pigs irritating substances of vegetable and animal nature, such as pepper, cantharides, fragments of sarcoma, carcinomatous mamma, particles from the caseation of a sarcomatous tumour, and other non-tubercular matter, with the result that in most instances the animals remained quite healthy, and when killed had no disease of the viscera. In other cases he showed that foreign bodies could set up ordinary inflammatory action, the products of which could not be anatomically distinguished from true tubercle, which always followed inoculation with true tuberculous matter. These secondary tubercles, after inoculation with tuberculous matter, had the distinguishing characteristic of increasing infectiousness from successive inoculations. Hence he concludes tubercle is an infective malady, owing to the presence of some morbific agent, peculiar to it, but undetermined.

The most remarkable inoculation experiment on record, and one which has not attracted so much attention

* *Lancet*, Aug. 5, 1882, p. 172.

as it appears to deserve, is the only recorded case of experimental inoculation in the human subject:—

"Demet, Paraskeve, and Zallonis, in Syra, Greece, were not only successful in transmitting the disease to rabbits by inoculation with the sputa and blood from a man affected with phthisis, but they ventured on the experiment of inoculating a human patient whose history gave no indications of tuberculous taint, and whose lungs were found to be healthy, but who was suffering from gangrene of the big toe, due to obliteration of the femoral artery. A fatal termination was inevitable, and sputum from a man who had abscesses in his lungs was inoculated in the upper part of thigh. Three weeks afterwards there were evidences of disease at the summit of the right lung, and at the time of death, thirty-eight days from date of inoculation, it was found that the upper lobe of right lung had seventeen tubercles in first stage, two of the size of a lentil, the others as large as a grain of mustard. Two similar tubercles existed at the apex of the left lung. Two tubercular masses were found on the convex surface of the liver."*

Numerous other observations show that injection of tuberculous matter from man, from the ox, or from the milk of tuberculous cows will give rise to tuberculosis in pigs, sheep and goats, rarely a positive result in rabbits, a negative result with dogs and cats. Later Viseur, at Arras, showed that cats were not exempt from tubercle induced by the eating of tuberculous matter.

"Klebs found that rabbits and guinea pigs were very susceptible to the influence of milk from tuberculous cows, and he accidentally induced the disease in a dog by feeding it with the milk of a phthisical cow. The vital tenacity

* *Med. Chi. Review*, Oct., 1874.

of tubercle virus appears to be remarkable, as shown by these inoculation experiments: it preserves its potency through three or four generations. Inoculations will succeed with matter from a subject which has been dead 36 hours, and with sputa which has been dried for 20 days. If thoroughly boiled its vitality is destroyed, and Klebs found that the action of alcohol deprived it of its potency."*

"Chauveau, of Lyons, in 1868, administered to three healthy calves about thirty grammes of tuberculous matter from an old phthisical cow: the caseous, puriform, and cretaceous mass was pounded in a mortar and dissolved in water, and then administered from a bottle.

"Fifty-two days afterwards the miserable aspect of the three infected creatures contrasted in the most extraordinary manner with the thriving condition of the non-infected one which had been kept under similar conditions for comparison. The autopsy revealed the most perfect lesions of general tuberculosis, the mesentery and intestines being extremely involved. He concludes:—

"1. The experiments prove that bovine animals contract tuberculosis by digestive injection.

"2. They place beyond a doubt the fact as to the virulence and contagious property of tuberculosis.

"3. That the digestive canal constitutes in the bovine species, as in man, a channel of contagion readily disposed for the propagation of tuberculosis, and which may be more frequently the mode of access than through the pulmonary organs."†

Other observers established the existence of a definite virus in other ways: dogs and various animals were made to breathe an atmosphere in which the sputa of consump-

* *Med. Chi. Review*, Oct., 1874. † *Ibid.*

tive patients were diffused in the form of spray, whilst they made others respire air through which they diffused atomised liquids impregnated with non-tuberculous substances. It was found by Tappeiner,* and others, that in all cases where real tuberculous matter was used tubercles were found in the lungs, kidneys and other organs, the abundance of the tubercles being generally proportionate to the length of the experiments and the frequency of the inhalations. In those cases where non-tuberculous matter had been sprayed into the air no tubercles were found. Carrying the idea a stage further, M. Giboux caused rabbits to inhale the air expired by consumptive patients, and he found that at the end of about three months the rabbits emaciated and at last died from general tuberculosis, whereas other rabbits which were made to inhale similar air filtered through tow charged with carbolic acid showed no impairment of health, and when killed were found to be free from tubercle.

All these experiments point to the conclusion that there must be some special infecting virus in tubercle, and it is now five years ago that Professor Klebs believed that he had demonstrated a necessity for the existence of a microphyte, monas tuberculosus, to which he presumed the contagiousness of tubercle was due; and thereupon Dr. Schüller, of Greifswald, and others advised the more active antiseptic treatment of the disease.

In spite, however, of the suspicions and speculations of various thinkers, and in spite of the abundant evidence from inoculation, evidence amounting almost to mathematical demonstration, no one had as yet succeeded in detecting by ocular evidence any microphyte which might be looked upon as the specific germ by which the disease

* Virchow's *Archives*, vol. lxxiv., 1878.

might be inoculated and by the dissemination and growth of which it might be supposed to spread. *Professor Koch, of Berlin, has recently given to the world the most striking corroboration of the truth of the theory which hitherto had not received general acceptance. Koch, having previously demonstrated the existence of the bacillus anthracis as the cause of splenic fever, and of various other bacilli in cases of septicæmia, set himself the task of discovering the specific germ which so many authors believed must exist, although its presence could only be proved by indirect evidence. By special methods of aniline staining Koch was at last able to show that in all true tubercles found in cases of general tuberculosis a peculiar micro-organism could be seen. The bacilli of tubercle were found to be delicate rod-shaped bodies, varying in length from quarter to one half the diameter of a blood corpuscle. They are found in all cases within the giant cells of the grey granulation, and are most numerous in recent and advancing tubercle; they become fewer in proportion as the tubercle gets older, and finally disappear on the healing of the tubercular ulcer. The expectoration also was found to contain multitudes of these bacilli, whilst none could be discovered in the sputa of non-tubercular patients. He also found that the bacillus of tubercle required, in inhabitants of the temperate zone, about the warmth of the animal body for its growth and increase, that in fact the bacilli did not increase in numbers in the sputum whereas the putrefactive bacteria would rapidly increase.

A special dye was discovered by which the bacilli could be isolated from all other substances, and thus readily demonstrated by its colour. The process was afterwards

* Berliner Klinische Wochenschrift, No. 15, 1882.

improved by Ehrlich; and various other methods, more particularly that of Heneage Gibbes, have come into operation. The principle of all these methods is the same, viz., to stain the bacilli of one colour and the ground substance of another, by which contrast the minute germs can be readily seen even without the highest powers of the microscope. Professor Koch did not stop here; having shown the existence of a definite germ, having described its characteristic appearance and its difference from other bacilli which accompany it; having shown that by staining agents it may be differentiated from other similar bodies, and that it requires a special temperature for its growth and multiplication, he then endeavoured to prove that this visible germ is the germ by which the infection of tubercle is conveyed. His attempts were crowned with complete success; he was able to cultivate the bacilli artificially through many successive generations; after transference from one soil to another a great number of times the original tubercle matter was at length got rid of, and nothing but the bacilli left behind. He then ascertained that inoculation with these bacilli, isolated from all the original matter with which they were associated, was followed by reproduction of the parasite, and the induction of tuberculosis, as certainly as when the tuberculous matter itself was inoculated. Further he found that filtration of the fluid containing the bacilli through porous clay destroyed its virulence, the fluid which passed through became innocuous, whilst the substance which refused to pass the filter would readily give rise to tuberculosis.

The method of cultivation of the bacilli adopted by Koch is not an unimportant part of his discovery, inasmuch as it enables him to isolate any particular form of growth from others which may be accidentally associated

with it. The pure cultivation of any particular pathogenic bacterium is effected by adding three to five per cent. of gelatine to the infusion or other substance with which he is experimenting; in this way growth takes place on a *solid* soil, which can be clarified, and will so allow of constant observation as to what is going on upon or within it.

If any accidental growth occur it only spreads at one point, and fresh material can be inoculated from a pure part without risk of contamination.

The bacilli have been found by Dr. Koch in the following cases:—Eleven cases of miliary tuberculosis, twelve cases of cheesy broncho-pneumonia, one case of tubercle in brain as large as a hazel nut, two cases of intestinal tuberculosis. Three cases of freshly extirpated scrofulous glands were examined, in two of which bacilli were found enclosed in giant cells; and in two out of four cases of synovial degeneration of joints they were present in small numbers in giant cells.

Among the lower animals ten cases of perlsucht, three cases of bronchiectasis in cattle, a cheesy gland in a pig, a tubercular hen, three monkeys which died of spontaneous tuberculosis, nine guinea pigs and seven rabbits which had spontaneous tuberculosis, and 172 guinea pigs, 32 rabbits, and five cats which had been infected with the disease; in all of these the tubercle-bacilli were found.

In this way the constant presence of a distinct organism in association with a distinct pathological process was clearly demonstrated.

On the other hand it was found that inoculation with material which did not contain the living bacilli was not followed by tuberculosis. In all cases when the material inoculated contained the living bacilli the result was

positive, but when the material inoculated did not contain bacilli a negative result was obtained, the animal remaining healthy in spite of inoculation. Experiments were performed with the contents of a scrofulous gland, and with degenerated synovial membrane, neither material containing bacilli; and also with the tubercular lung of a monkey, some parts of which had been dried for two months, and some kept one month in alcohol, and in no instance did tuberculosis follow.

That the disease following inoculation was not due to accidental causes independent of the bacilli was shown by the fact that the artificial disease differed from the spontaneous one: such a plentiful crop as occurs after inoculation never develops spontaneously in so short a time; and again in the natural disease the bronchial glands become enlarged and cheesy and then the lung is affected, whereas in the artificial disease the glands nearest to the seat of inoculation (generally in the abdomen) were first enlarged, and the spleen and liver were specially affected.

In order to prove that the bacilli were the real and only cause of the infection it was necessary to proceed a step farther, and to isolate them from all their surroundings by the process of pure cultivation on a solid substratum of gelatine. The ordinary gelatine would not do for the purpose, inasmuch as it was found that these bacilli require a temperature approaching that of the body for their growth, and at this temperature the gelatine cultivating preparations become fluid. The material which was found to answer the purpose the best is blood serum which has been rendered solid by heat, but which has not been exposed to so high a temperature as to become opaque. It was found that about the tenth day after inoculation of this solid blood serum with any tuberculous

material small points and scales became evident, which slowly spread, and were seen to consist of tubercle-bacilli. After about fourteen days some of these bacilli were transferred to fresh blood serum, and this process was repeated several times. Thus the original material was entirely got rid of, and only the bacilli developed from it remained; and now it was found that inoculation with the pure bacilli produced tuberculosis with the same certainty as did the inoculation of tuberculous material containing living bacilli.

Mr. Watson Cheyne, in his report to the Association for the Advancement of Medicine by Research, confirms in every detail the conclusions given by Koch. He says:—

"In man we have the disease termed acute miliary tuberculosis, which resembles in every respect—histological structure, tendencies and presence of bacilli—the acute tuberculosis produced in animals by the inoculation of tuberculous material. It will be admitted that the two diseases are identical, and as they are identical their cause must be the same, viz., the tubercle bacillus. We may therefore say definitely that the tubercle bacillus is the cause of acute tuberculosis, and that scrofulous glands, degenerated (strumous) synovial membranes of joints, phthisical lungs (in short, all those materials obtained from man which, inoculated into animals, produce acute tuberculosis), contain in them bodies (bacilli) which, if they entered the circulation in sufficient numbers, would give rise to tuberculosis. It has been demonstrated by several observers that probably in all cases of acute tuberculosis a place can be found where these bacilli get into the circulation."*

* *Practitioner*, April, 1883, p. 307.

Experiments on the lower animals appear to establish the fact that phthisis, being the result of a specific poison, the tubercle bacillus, must be classed amongst the contagious diseases. What evidence can be adduced from the clinical side in support of this view?

Clinical Evidence (Animals).—As regards the lower animals it appears to be generally admitted that tuberculosis is contagious. Fleming* states that the disease tuberculosis is common in animals, especially in confinement, and that the bovine species are most affected. Cruzel says that in one hundred old oxen fattened and slaughtered for food at least one half will have the lungs more or less tuberculous, and further that the disease is communicated by the expired air in low badly ventilated buildings, and that it is rare that the breath of bovine animals affected with phthisis has not a remarkable odour from which the disease may be diagnosed. Viseur, of Arras, in 1868, pointed out the persistence of the malady in certain establishments. Zundel also found this in Alsace; he observed that healthy animals soon became affected in particular stables. A remarkable illustration of this is that given by—

"M. Grad, Alsace. Every year for five years one of his cattle died of phthisis, and what is very curious, said the farmer, this always happens in the same stall. The sixth died, a healthy cow placed there by M. Grad. The stall was then rebuilt, after thorough disinfection, and no more tuberculosis appeared."

Numerous examples of phthisis from inhabiting a contaminated stall are recorded by various writers.

Further instances are recorded of contagion from the bovine and feline to the human species, or *vice versa*:—

* *Med. Chi. Review*, Oct., 1874.

"Cullimore reports that a strong healthy dog lapped up the sputum of a tuberculous man and died shortly of phthisis."*

It seems highly probable that contagion may spread by the milk of high class cows which are very subject to tubercular disease.

Mr. Law, of Cornell University, writes:—

"In a case that recently came under my notice in Brooklyn, New York, a family cow was found in an advanced state of tuberculosis, and the owner and his wife were evidently rapidly sinking under the same malady. In another case reported to me, a family cow, supposed to be suffering from the lung plague, was found to be afflicted with tuberculosis instead, and the owner's wife (a consumptive), who had been making free use of the milk warm from the cow, was persuaded to give it up, and underwent an immediate and decided improvement. It is for infants and adults who are somewhat infirm or out of health, or whose surroundings are not of the most salubrious kind, that the danger is greatest; but this embraces such an extended class that the moral interests involved are almost illimitable. The destruction of infancy and wasting of manhood from this cause is unquestionably far greater than has been hitherto realised."†

Clinical Evidence (Man).—The facts with regard to contagiousness from man to man are thus given by Petersen, in 1870, who sums up the results of his inquiries and observations in the following propositions:—

"1. That a contagious origin of some cases of phthisis cannot on sufficient grounds be denied.

"2. That phthisis caused by contagion is in general of a very dangerous and inflammatory character.

* *Brit. Med. J.*, May, 1880. † *Ibid*, Sept., 18, 1880.

"3. That it must justly be considered hazardous to lie in the non-disinfected bed of a phthisical patient, and to be habitually in too close contact with such a person.

"4. That this danger in Denmark seems to be greatest in the warm period of the year."*

My own experience on this point is limited to an occasional case in which the husband appears to have taken the disease from the wife, or the wife from the husband.

About two years ago I was consulted by a young married man whose wife, much older than himself, had recently died of tubercular phthisis after an illness of about twelve months. His family history was good, father and mother both living, over 60 years of age, and no history of phthisis in his family. His own health had been good till six months after the death of the wife, when he noticed a little cough and expectoration in the mornings with occasional streaks of blood. Hæmoptysis in small quantity occurred in October, November, December, 1880, twice in February, 1881, and in March there was a little crepitation at the left supra scapular region. In March, 1882, he had quite recovered: there were no physical signs of disease, but patient was seldom free from cold, and had lost more than a stone in weight. He is now (May, 1883) quite well.

Another case which has come to my notice is that of a husband and wife in a country village reputed to be healthy, who both died within a day of each other of tubercular phthisis, six years after their marriage. The wife, aged 30 at time of death (in August, 1882), was one of five sisters, whose father died of consumption in 1871. She had never been very strong, and at the age of 18 was supposed to be consumptive, at the time when her

* *Med. Chi. Review*, July, 1870.

father was laid up with lung disease. After her marriage she seems to have been quite well, and stronger than before, with no suspicion of any disease of the lungs. Three years after their marriage the husband, then aged 26, got a succession of colds, and was never well afterwards. Two years after the commencement of the husband's illness the wife caught cold, spat blood, and then rapidly failed in every respect. She was in constant attendance on, and cohabited with, her husband during the whole period of his illness.

"A remarkable series of cases occurred at the Bristol Royal Infirmary in 1878, which have been quoted by Creighton as cases of infective tuberculosis occurring in an epidemic form in the human subject similar to the well known bovine tuberculosis. Three cases occurred in a reformatory school, two of them were patients of my colleague, Dr. Spencer, and one was under my care. They were all presumed to be cases of enteric fever, but they had no very decided typhoid symptoms. All died, and after death were found to have general tuberculous meningitis and intestinal lesions, but not quite of the enteric character. A few small ulcers existed in the ileum, but there were none in the large intestines. In one a few miliary tubercles surrounded a caseous nodule in the lung, which was presumed to be the focus from which tubercle infection had emanated under the influence of a typhoid pyrexia."*

Mr. G. A. Brown, of Tredegar, gives me the following history:—"A family named G. Husband a delicate man, with a doubtful history of phthisis in his family. Wife a strong, hearty woman, with no history of phthisis in any member of her family. Their family consisted of two

* *Bristol Royal Infirmary Reports*, Vol. I., p. 167.

daughters and one son. The son died, aged 18, from an accident. The younger daughter died in October, 1879, from phthisis, aged 18. The father shortly afterwards had a bad attack of bronchitis. He subsequently became phthisical, and died September, 1880, aged 50, of phthisis. The mother, during her husband's last illness, complained of cough, and spat blood. She rapidly lost flesh, and died of phthisis in April, 1881. The elder daughter is still a strong, hearty woman."

The facts suggest two questions:—1. Did the younger daughter inherit from the father's side a phthisical taint, which developed subsequently in the father himself? 2. Was the mother's a case of phthisis communicated from husband or daughter?

Mr. Bernard Kendall, of Clifton, gives me a history of two cases of apparent contagion:—"C. K., fifth son in a family of thirteen children (of whom eight are now living, the eldest being 60 years of age) married a lady in delicate health, and who was constantly obliged to winter by medical advice at Torquay, or other places in the South of England. They lived together for about six years, when the wife died of phthisis, and the husband, who was supposed to have contracted his disease from her, died about two years afterwards from the same disease. One other member of the family died of phthisis, a younger brother, who was in the mercantile service, and who contracted the disease in the China seas."

"M. W. died of phthisis, and was closely attended by his wife, who had previously enjoyed good health. She is supposed to have contracted the disease from her husband, and she died last week of phthisis."

Numerous isolated cases of apparent contagion are recorded by various observers, and the enquiries being

made by the Collective Investigation Committee of the British Medical Association are likely to bring out some interesting results.

Macaldowie, from a total of four hundred patients in the North Staffordshire Infirmary, found four cases in which the wife became infected from a tuberculous husband.*

Dr. Murrell reported a case whose wife was infected by her husband.†

Dr. H. Weber has adduced evidence in a series of cases where the several wives of consumptive husbands fell successively victims to tuberculosis.

Leudet ‡ gives an account of fifty-six families, of which in fifteen the husband was tubercular at marriage and the wife then healthy, and in forty-one the wife was alone affected. Of the first fifteen, in five the wives became affected, two having had relatives dying of consumption, and a third not becoming affected till ten years after her husband's death. Of the other series, only three husbands became affected, and of these one had lost a sister from tuberculosis. He concludes as follows:—

"1. Wives contract tuberculosis more readily from their husbands than husbands from their wives.

"2. Wives who are not themselves affected may give birth to children who die of phthisis.

"3. Marriage hastens the fatal termination.

"4. Tuberculosis may often develop among different members of the same family at short intervals without hereditary predisposition."

In warm climates opinions are more decidedly in favour of contagion. In Italy quarantine regulations used to be

* *Lancet*, II., 81, p. 825. † *Ibid*, I., 80, p. 802.
‡ *Lond. Med. Record*, Jan. 15, 1883.

enforced regarding deaths from phthisis; innkeepers and others have levied a heavy tax for disinfection of rooms where consumptives have been. In India such patients are said to be dangerous as lepers.

Dr. Reginald Thompson adduces evidence that a special form of phthisis exists which he calls "Infective," a disease with peculiar symptoms and signs of its own, approximating it closely to those of pyogenic or infective pneumonia. The observations embrace a period of 10 years, and include 25,000 patients; in a series of 15,000 cases only fifteen of them were of this infective kind—one per thousand. The characteristic features are:—A slight hacking cough the earliest symptom of infection, symptoms of constitutional poisoning, rapid emaciation, rigors, occasional hæmoptysis, physical signs bilateral, local disease disproportionate to the amount of constitutional symptoms, physiognomy not that of phthisis, skin sallow not pale, with history of contagion, and absence of family history.*

The weakest chain in the argument appears to be the evidence, or rather the want of sufficient evidence, derived from clinical experience. How comes it that with the special infective germ so widely distributed as it must be that we do not all die of tuberculosis? The marvel is not that so many are affected, but that so many escape. Clearly there must be a special nidus in which alone the tubercle bacterium will prosper: like other bacteria a special soil is necessary for this particular form. The researches of Tyndall and others have shown that bacteria of putrefaction grow very unequally in different fluids: one important element in their growth is fitness of soil. The same condition of things exists with regard to all the zymotic diseases: all persons are not equally susceptible

* *Lancet*, Nov. 6, 1880, 726.

to the action of the poison of variola, scarlet fever, typhus, &c. We can only account for the escape of the many, by supposing that there are certain conditions of health in the few affected ones, which so degrade the vitality of the tissues as to render them a fit breeding ground for this particular form of bacterium, and that only under these conditions will the parasite germinate and prosper. On the other hand there are certain mechanical difficulties in the way which may also account for the only occasional growth of these organisms in those who appear to be fit subjects. It is probable that the lungs are the more usual mode by which the germs gain access to the body. Now, it has been assumed by Lister, and proved by Prof. Tyndall,* that the air which passes along the respiratory passages becomes purified in its transit, and is absolutely aseptic in the air cells and finer air passages: hence it follows that any particles suspended in it will be arrested by the mucous membrane and the larger tubes, and the bacilli will therefore be unable to reach the deep recesses of the lungs: when so arrested ciliary action will gradually cause them to travel back towards the trachea, and they will ultimately be ejected in the bronchial mucus discharged by coughing. Koch found in his cultivating experiments that, under ordinary conditions simulating those within the body, the bacilli undergo little or no change for about ten days; meanwhile long before germination has taken place they will be too far away from the lungs to effect any mischief. It is true that particles of carbon and other foreign bodies, such as cinnabar, do and may be made by experiment to reach the ultimate recesses of the lungs, but it is probable that this mechanical difficulty in transit may be one of the causes

* Tyndall, *Floating matter of the air*, pp. 36, 37.

why so many persons escape the action of these widely distributed germs.

If mere debility, a mere want of resistance to outside influences, a mere degradation of vitality of the tissues constituted the reason why one begets the disease and another does not, it would be difficult to account for the only occasional cropping up of phthisis as a direct sequel to various acute diseases more particularly of the lungs. It is a familiar fact that cases of chronic pleurisy of simple inflammatory origin, although in general aspect simulating phthisis, are yet essentially different in their nature and results; the specific virus is wanting, and the patient slowly gets well after a very protracted illness, which can scarcely be distinguished clinically from some forms of tubercular phthisis. Again it has been a matter of constant remark that "cold" is powerless to excite tubercle. The soldier, exposed to all the inclemencies of a campaign, sees phthisis disappear from the ranks, while in the comfort and warmth of garrison life he finds his comrades decimated by its ravages. The sailor, again, threatened with tubercular lung disease, finds that the open air life at sea, with exposure to all weathers and in all latitudes, soon restores the failing health and removes the disease which may have already commenced. The germ theory of tuberculosis also accounts for the fact that tubercle loves low-lying places, and is not met with at certain altitudes: just as Professor Tyndall could safely open some of his hermetically sealed tubes with organic infusions at the top of some of the alpine peaks without risk of introducing germs from the pure air around, so the pure air of these altitudes is little likely to give rise to a purely zymotic disease. Again, the warmth of the tropics is likely to be favourable to the growth of the bacilli, which accounts for

the rarity of the disease at the poles, the increase of intensity towards the tropics, and its exceeding malignancy there. Tubercle, again, finds its habitat in crowded places, and is intense in direct proportion to the concentration of the population, as in prisons, barracks, factories, &c. In illustration of this point may be mentioned the fact that phthisis was found to be three times more prevalent in Millbank than in London generally, and the prisons of France and Algeria were found to show similar results. Mere crowding in all parts of the world on the other hand, and re-breathing the same air as in the snow huts of the Greenlander, has not been shown to give rise to phthisis.

The absence of a frequent occurrence of direct contagion will scarcely be considered a powerful argument against the formidable array of facts in favour of the contagiousness of phthisis. It is highly probable that a more careful observation of the conditions surrounding the onset of the disease will show that a possible direct contagion is more frequent than is generally supposed, or has yet been shown to be. Every one will remember the long debated question as to the contagiousness of typhoid: no one now doubts the existence of a definite typhoid poison to which alone when introduced to the body under certain favourable conditions the disease is due: we cannot always trace the mode of entrance, but we admit that the poison must have been introduced. Just as the typhoid poison is discharged by one particular excretion, so in phthisis the poison may be given off by one excretion only, and this not in a form which is likely to gain access to the bodies of others whilst the germs are still active. There is however one way in which self-infection from one part of the body to another is very easy, and it having

been shown that tuberculosis in animals is easily induced by artificial feeding with tuberculous matter, is it not probable that the intestinal lesions of chronic phthisis are the result of self-infection by the swallowing of the secretions from the lungs?

Mr. T. F. Edgeworth reports to me a case of chronic diarrhœa, with disease in the lungs, which is clearly of a tuberculous nature; the patient never expectorates anything, but on extracting the mucus from the throat after a cough the product is found to contain numerous bacilli, and the fæcal evacuation also contains bacilli, with the characters of those found in tuberculous sputum.

Dr. Davey, of Clifton, informs me that insane patients rarely expectorate, but he was not able to form an opinion as to whether intestinal ulceration is more frequent in cases of phthisis found in the asylums for the insane than in those found elsewhere. On my mentioning this topic to Dr. A. Law Wade, of the Wells Asylum, he examined the recent records, and found that since July, 1882, there had been 14 deaths from phthisis, and in six of these there were tubercular ulcers in the intestines; in two the lining membrane of colon was thickened and congested throughout; in two there were patches of deep congestion, which did not appear to have proceeded to actual ulceration of surface, both of these were of short duration, one was a case of acute tuberculosis, and the other of phthisis with acute pneumonia.

Some confirmatory evidence as to the contagiousness of phthisis has been adduced by Mr. Thomson in his work on the Germ Theory of Phthisis, verified and illustrated by the increase of phthisis in Victoria. His statistical labours have shown that the mortality from phthisis in Victoria is greatly on the increase, viz., from 7.9 per

10,000 living between the ages of 15 and 25 in 1871, to 9.9 per 10,000 living between the same ages in 1881, or taking all ages from 11.49 per 10,000 in 1871 to 13.90 in 1881. Mr. Thomson regards "all idea about climate conferring an immunity from the disease as the most pernicious doctrine that could be inculcated." He maintains that the disease is never of climatic origin, nor is it due to dampness of soil or depressing circumstances of life: thus he regards the prevalence of phthisis amongst servant girls as due solely to the inhalation of the germ laden dust of the bedrooms they have to sweep out.*

Dr. W. T. Belfield† alludes to the argument against the infectiousness of tuberculosis founded on the fact that we do not all die of this disease. He says, "The general principle—the survival of the fittest—seems to have been for generations at work in eradicating the disease from the human family by removing those members of it susceptible to tuberculosis; the great majority of us now living are as safe from tuberculosis as most dogs are from anthrax." He also states that "one after another, the German and French pathologists (who are not infrequently clinical teachers as well), honest in their previous conviction that the communicability of tuberculosis was not proven, honestly recorded their convictions as succeeding proofs were furnished . . . . so that three years ago Cohnheim said, 'To-day there scarcely exists a pathologist who would deny that tuberculosis is a communicable disease.'"

The supreme question now before the medical world is, not whether tuberculosis is infectious, but whether the bacillus of Koch is the infective agent. The two questions are quite independent, the former established, the latter

* *Med. Record*, Feb. 15th, 1883.

† *New York Med. Record*, March 10th, 1883.

awaiting confirmation. That confirmation has now been given by Cheyne.*

I cannot refrain from quoting the following suggestive remarks of Dr. Solomon Smith.† He says: "Here we have an instance in which the contagion habitually passes over the strong to attack those who are fitted for it either by constitution or by preceding disease, or by reduced surroundings, and even when it has picked out a feeble member of the flock and attacked such an organ as the lung, is usually impotent against those portions whose functional activity is greatest, and is prone to affect those in which renewal of air and removal of exfoliated epithelium are least perfectly performed, such as parts which have been inflamed or tied down by previous thickening of the pleura, and especially the comparatively unused apices of the lungs. When we see the chest of a phthisical patient covered with patches of cloasma, the thickened and unremoved epithelium infiltrated by the spores and mycelium of the microsporon furfur, we may carry the mind's eye inwards and think of the apices of the lungs and the similar processes going on within them, their air cells, little moved by the feeble respiratory efforts of the patient, gradually plugging up with exfoliated epithelium, matted together by the growth of tubercular bacilli, which, although carried in far greater number into those portions of the lung whose functional activity is greater, have only been able to take root in the half-dead epithelium of the stagnant apicial air-cells."

Additional evidence in favour of, and in demonstration of the existence of a contagion in phthisis, has been adduced in the investigation of the question as to the diagnostic and prognostic value of the bacillus tuberculosis

* *Practitioner*, April, 1883. † *Lancet*, August 26th, 1882.

in the sputum and elsewhere. Various observers have worked energetically in this direction, and the most important results are the following:—

Balmer and Frærtzel* have given an account of 120 cases of phthisis in which the sputa were examined. The bacilli were found in all. They believe that the number and degree of development of these are of considerable prognostic value, that the more rapid the process of lung destruction the larger is their number, it being greatest towards the end of the disease. They found that in the rapid cases the organisms were not only numerous but large, well developed, and spore-bearing, but on the other hand, when the disease was arrested or making very slow progress, they were small, presented no trace of spores, and were always few in number.

They sum up their conclusions thus:—

"1. A definite prognosis may be made from the number and stage of development of the bacilli in sputa.

"2. The number of bacilli in sputum increases proportionately with the advance of the destructive process in the lung, and attains its maximum as the end approaches.

"3. Distribution of bacilli is not in all cases the same. Sometimes they are evenly scattered and sometimes are in groups.

"4. Their appearance is not constant. They are often small, ill developed, and without spores, and small in number.

"5. Such bacilli are found when the disease is progressing but slowly or has been checked.

"6. Bacilli are large and rich in spores in all rapidly advancing cases with high temperature, night sweats, &c.

* *Berl. Klin. Woch.*, 1882, No. 45.

"7. In every case in which the bacilli were plentiful there was high fever, and the converse was also true.

"8. The difference in quantity of bacilli in the fluid of a cavity and that in the lung tissue surrounding the excavation was very marked, numerous in the former, scanty in the latter.

"9. From this it appears that the sputum affords a more favourable place of growth than does the still living lung tissue.

"10. We may not ascribe the rich development of bacilli in the lung cavity to the presence of oxygen, for they are equally abundant in the purulent secretion of a tuberculous joint."*

Dr. Whipham gives results of examination of 20 cases, and was disposed to think that in acute tuberculosis and in exacerbations of the disease the bacilli were especially numerous in the sputa, and that when the disease is arrested, or the patients improving, the organisms were greatly reduced in number or disappeared from the expectoration.†

In the discussion which followed the reading of the above mentioned paper at the Medical Society of London, Dr. Samuel West gave his own observations and the following deductions:—

"1. He had found bacilli present in every case of phthisis which he had examined, though in some cases they were in such small numbers as only to be found after repeated and very careful examination.

"2. The number he had found, as a general rule, to vary with the rate of breaking down of the lung, and therefore, in most cases, with the gravity of the disease.

* *Berliner Klinische Wochenschrift*, Nov. 6th, 1882.

† *Lancet*, Feb. 10th, 1883.

"3. The arrangement of the bacilli in the sputum varied much. At times they were isolated, few in number or many, and very numerous in rapid cases; at other times arranged in groups or masses, and this appeared to be the rule in the most rapid cases.

"4. In some instances the bacilli contained small, bright bodies, which had been called spores, and this seemed to be a common condition in acute cases.

"5. There appeared to be but little variations in the size of the individual bacilli in different cases.

"6. In cavities the bacilli existed in large numbers, and usually in masses. The more cheesy matter, or fluid from a cavity, there was in the expectoration the more bacilli we might expect to find; consequently, in a case of acute tuberculosis, before breaking down of the lung, we should expect to find none."

Dr. Burney Yeo pointed out that the absence of bacilli was as important diagnostically as their presence, and mentioned cases in illustration of this fact.

Dr. C. T. Williams gave results of examination of sputum in 130 cases at the Brompton Hospital. Twenty-one were cases other than phthisis, in no one of these did the sputum contain bacilli. The 109 others were cases of phthisis in its various forms, and in 106 of these the bacilli were found, whilst in the three others it could not be affirmed with certainty that they were absent.

Dr. Heneage Gibbes pointed out the existence of two forms of miliary tubercle. In the reticular form he had only succeeded in finding bacilli in three cases, and these in small numbers distributed throughout the reticulum. In the non-reticular form, the tubercles having no fibrillation, and no ant cells, but consisting of irregular cells in the periphery and a caseous mass in the centre, he had

invariably found bacilli in large numbers in the caseous centre. He also pointed out the existence of bacilli even in the smallest tubercles. Again, a lung may be stuffed with tubercle, each one containing thousands of bacilli, and yet the patient will die before the destructive process has gone far enough to cause any of them to be ejected in the sputum.*

D'Espine, of Geneva, believes the bacillus to be of the greatest diagnostic value, but worthless as an element in estimating the prognosis. His conclusions are based on the examination of twenty cases with a positive result, and five cases of emphysena and bronchitis with a negative result.†

Dr. Heron gives the results of examination of sputum in sixty-two cases, all of which presented the usual symptoms which we associate with phthisis, and in all of which the bacilli were observed. He ventures to think that the prognosis of cases of consumption will, for the future, hinge upon the numbers and forms in which the bacilli are found in the sputum. He believes that the most rapidly fatal are those in which the bacilli are seen to be *grouped* in numerous masses throughout the sputum.‡

An interesting and important observation, showing the diffusion of bacilli in the air inhaled by patients with tuberculous disease, has been made by Dr. Arthur Ransome. In 1869 the author had examined the aqueous vapour of breath in health and disease. Vapour was condensed in a glass globe, surrounded by ice and salt, and in condensing it was found to carry down all suspended organic matters. On examining the breath of several advanced cases of phthisis, specimens of bacillus were

* *Lancet*, Feb. 24th, p. 321. † *Ibid*, Jan. 13th, 1883.
‡ *Ibid*, Feb. 2nd, 1883.

found in two cases, in several other cases the organism was not found, and it was not found in the aqueous vapour condensed in the waiting-room of the Manchester Consumption Hospital. In order to carry down the organic matter and to afford a basis to attach the material to the cover-glasses, fresh white of eggs, or a little mucus, was added to the fluid. The cover-glasses were treated by Dr. Heneage Gibbes's method of staining.*

This observation is supported by Dr. R. Charnley Smith, who allows the patient to breathe through gun cotton, which is afterwards converted into collodion, and examined for bacilli after the usual process of staining.†

Since my own observations began I have not once failed to detect the tuberculous bacilli in cases which, from other evidence, were assumed to be undoubted ones of tubercular phthisis. On several occasions I have failed to find them on the first examination, and during the cold weather of early winter I obtained only imperfect and unsatisfactory evidence in two or three cases of advanced phthisis at about the same time. One of these (No. 21) soon died, and was shown to be one of rapid tuberculosis by *post mortem* examination; the purulent nummular sputum was repeatedly examined, and only very few ill-defined and ill-stained organisms could be seen, scarcely sufficiently marked to establish their identity. The same result was found in another case at the same time; No. 20 was a case of chronic phthisis, with old cavities, and here I was not able to satisfy myself with the evidence of their presence. My partial failure on those two occasions was no doubt due to the fact rightly pointed out by Dr. Prideaux, of Wellington, that a moderately high temperature is necessary to perfect staining, and since I

* *Brit. Med. Jour.*, Dec. 16th, 1882. † *Ibid*, Jan. 20th. 1883.

adopted the method of warming the staining fluid for the purpose of securing more perfect and more rapid staining, I have been able to obtain the sputum from case No. 20, and found that the bacilli, although not numerous, are very readily and satisfactorily demonstrated.

In a third case, No. 19, I did not at first find bacilli, probably from the same cause (the low temperature of the air), and as the case was one of constitutional syphilis in which lung symptoms had recently manifested themselves, it was of some importance to make subsequent examinations: when this was done, a few weeks later, the bacilli were found to exist in large numbers.

These cases convinced me that no amount of length of exposure of the sputum to the action of the staining fluid would compensate for too low a temperature: the glasses were frequently allowed to remain for twelve and twenty-four hours floating on the stain, and still no bacilli were visible; whereas, if the fluid were treated with a spirit lamp till it began to give off steam, the staining would be rapid and the bacilli would be easily demonstrated.

The whole number of cases I have examined and recorded is 77: of these 49 were one or other of the various forms of tubercular phthisis: the remaining 28 had various other affections of the lung, some of them closely simulating phthisis: the list includes chronic bronchitis, bronchiectasis, chronic syphilitic pneumonia, slight hæmoptysis with no evidence of any disease, chronic pleuro-pneumonia, chronic pleurisy, apex pneumonia with subsequent breaking down from gangrene, sarcoma of lung, grey hepatisation, congestion from mitral disease, diabetes with bronchitis; two cases with strong family history of phthisis, cough with purulent expectoration,

but with no evidence of local disease in lungs, the patients rapidly recovering.

Of the whole series of cases there are some few of special interest.

Case 8 was admitted in consequence of sloughing of both tonsils. There was also abundant disease in the lungs. Bacilli were found in the sputum, as well as in the mucus dug out from the cripts of the disintegrating mass of the tonsil. By carbolic spray and antiseptic inhalations the throat gradually got well, and the general health improved. The question arises were the tonsils infected by the passage over them of the mucus containing the bacilli? and this question also suggests another, whether laryngeal disease may not be also a result of local infection from the same cause?

Case 7 was admitted in consequence of chronic diarrhœa, but with little evidence of disease in the lungs. This soon followed, and death took place in six weeks from the first onset of lung symptoms. Post mortem examination was not allowed, but the case appears to be a good illustration of acute pulmonary phthisis arising by infection from a previously diseased intestine.

Case 30 was admitted with symptoms of chronic bronchitis, and no evidences of phthisis were obtained at the first examination. The sputum was found to contain abundant bacilli, and then a more careful examination disclosed the presence of dulness at the right upper lobe. Death took place in two months, the lung having broken down rapidly, and it was found to be riddled with cavities from apex to base. The mucus obtained from the cavities on the post mortem table was found to contain densely crowded masses of bacilli.

Case 39 was one of chronic cystitis of four years dura-

tion. Acute pulmonary tuberculosis at last supervened, bacilli were very numerous in the sputum, and a careful examination of the urine disclosed the presence in it of similar organisms. This case illustrates the occurrence of primary disease in urethra and bladder, possibly due to the introduction of bacilli, culminating at last in general tuberculosis.

Of the series of cases in which no bacilli were found:—

Case 2 was one of chronic syphilitic disease of lungs, with evidences of cavity in the upper part of left lower lobe. A few months before, a drainage tube had been passed into this cavity through the chest wall, and the subsequent progress of the patient had been very satisfactory. He again recently came under observation with bronchitis and much muco-purulent sputum, but no bacilli could be detected, and the patient rapidly improved under treatment with iodide of potassium and iodoform.

A series of cases of special interest are the following:— The three patients belong to a family of thirteen, with a slight phthisical history. One sister died from acute phthisis, a brother died from acute pneumonia, and a second from some lung disease. Case No. 5 is that of the brother, 30 years of age, who was laid up in January, 1882, with acute pleurisy; he was then said to have pleuro-pneumonia, and afterwards acute phthisis. When I saw him in May, 1882, he had evidence of chronic pleuro-pneumonia of the right side, with a suspicion of cavity at the upper part of lower lobe. There was no evidence of disease at either apex. The nails were clubbed, and he was anæmic, but had no temperature, and only complained of dyspnœa on exertion. There had been abundant expectoration of muco-pus, which had commenced suddenly in February, and had continued more or less freely.

In December, 1882, he again came under observation, now with some slight hepatic enlargement, and a trace of albumen in urine. Through the winter he expectorated, at times very freely, but I was never able to find any tuberculous bacilli. In April he left Clifton much improved in general condition, having gained weight, having no expectoration, with no albumen in urine, no enlargement of liver, and with no evidence of anything more than chronic pleuro-pneumonia of right lung. The absence of tuberculous bacilli from the sputum quite supports the evidence derived from physical signs, that the disease is and has been a simple inflammatory one, and that its tendency is to cause waxy degeneration of the viscera from chronic suppuration rather than the usual results of pulmonary phthisis.

This patient's sister, case No. 6, is of a similar character. She is 26 years of age, has had chronic pleurisy of left side for two years, is well nourished, but anæmic, and complains of dyspnœa on exertion. There is no decided dulness on percussion, the breath sounds are feeble, crepitation can be heard all down the left side both in front and behind. There is a little non-purulent expectoration, containing putrefactive but no tuberculous bacilli. The physical signs are now at least suggestive of chronic phthisis, but the whole history of the case is that of chronic pleurisy.

The third case of the series, No. 32, is another sister, 24 years of age, who after six months of phthisical dyspepsia and debility came under my observation early in February, 1883. She was found to have cavernous breathing at the left supra spinous fossa, crepitation at the right apex posteriorly and below both clavicles down to the third rib. She had much emaciated, and voice

was weak. There was a decided hectic flush, and she had copious night sweating. Expectoration was free, consisting of muco-pus, which was found to be crowded with tuberculous bacilli.

Another sister in the same family was said to be dying of phthisis ten years ago, but is now living and in good health, with no evidence of any lung weakness.

We have here in the same family two sisters and a brother, all with chronic lung disease, two of them of an inflammatory, the other of a typical tuberculous character, the sputum of the latter crowded with bacilli, whilst that of the two former contains none. The phthisical sister and the non-phthisical brother are now living in the same house, and the bacilli are no doubt disseminated freely throughout the house in spite of antiseptic inhalations and disinfection of sputum. The brother, debilitated by chronic pleurisy and chronic suppuration in lung, affords in all probability an excellent field for the growth of bacilli. It will not be surprising if in spite of all precautions his purulent sputum becomes a nidus for the growth of the tuberculous germs, should he escape the perils associated with waxy disease which now threaten him. May not this be the reason why so many cases of chronic pleurisy ultimately die of phthisis, that they become fit subjects for the growth of these all-prevalent tuberculous germs?

The most important observations as to the diagnostic value of the tubercle bacilli have as yet related to the sputum discharged from the air passage. They have, however, been detected in the urine on several occasions.

Rosenstein* has demonstrated their presence in a case of uro-genital tuberculosis of four years duration, and

* *Centralblatt f. d. Med. Wiss.*, 1883, No. 5.

Lichtheim had previously observed them in the pelvis of the kidney of a patient who had died from the same disease. Burney Yeo also states that they have been observed by Barrow in the urine. One of my cases (No. 39) is another illustration of their occurrence in the urine in chronic cystitis, which at last culminated in acute miliary tuberculosis of the lungs, the bacilli being present in the urine and in the sputum. The discharges from the intestine of this patient were not examined for bacilli, but in all probability they would have been found if sought for. They have previously been observed by Lichtheim in the stools of tuberculous patients.*

As regards the examination of fæces, Dr. H. Menche† holds that the presence of the true tubercle bacillus in the intestinal contents is due to the admixture of the secretions of tuberculous ulcers, and that the bacilli are found only in the stools of the really tuberculous. It has been asserted that similar bacilli in the fæces stain in the same way, and are undistinguishable therefore from the bacilli of tubercle. I have myself examined the stools of only two or three cases, in one of these I found numerous tuberculous bacilli, case No. 48; this was a case of chronic diarrhœa, with phthisis, in which the sputum contained bacilli. In another patient, with chronic diarrhœa from carcinoma of liver, I found numerous putrefactive bacteria, but no bacilli which would be recognised as like those of tubercle. Further observations are necessary to establish the value of the presence of tubercle bacilli in the fæces as an aid to diagnosis, and, as pointed out by Lichtheim, single staining is better than double staining for this purpose, as in this way the other micro-organisms remain invisible.

* *Fortschritte der Med.*, No. 1, 1883.

† *Vertr. im Niederrhein Ver. f. Nat. a. Heilk*, Jan. 22nd, 1883.

My observations quite accord with those of Ehrlich, Balmer and Fræntzel, Guttmann, D'Espine, Lichtheim, Fränkel, Ziehl, Heron, Gibbes, Green, West, Yeo, Whipham, Councilman, and no doubt many others. All agree that while the bacilli are found in the sputum in a very large majority of cases of pulmonary tuberculosis, they are not found in any other disease.

The observation of Koranyi, that he found similar organisms in a case believed to be one of pulmonary syphilis, will be scarcely considered as evidence to the contrary. Three of my cases might have been diagnosed as pulmonary syphilis, inasmuch as all had evidences of lung disease associated with recent constitutional syphilis. Two of these were found to have abundance of tuberculous bacilli in the sputum, and are running the course of ordinary chronic tubercular phthisis, not modified by antisyphilitic treatment; the third is one of chronic lung disease, in which no bacilli are present in the sputum, and which is much benefited by iodide of potassium. The presence of bacilli may, therefore, serve as an indication for treatment, if present iodide of potassium is not likely to be of service, if absent then the disease may be of syphilitic origin, and require treatment accordingly.

Dr. Koch's assertion of the association of the bacillus with tuberculosis, its presence in every case of this disease, its absence in all other morbid conditions, is thus being confirmed by all who investigate it.

His assertion of the causal relation of the parasite to the process stands as yet unchallenged. In spite of outcries from the Western States that the bacillus is only a crystal, every observer who is competent to judge finds that Koch's statement with regard to it cannot be refuted. It is only fair to infer that his further statement, "based

upon a demonstration unexcelled in the history of experimental science for accuracy, clearness and completeness" (Dr. W. T. Belfield, Chicago), that the bacillus is the actual cause, the one invariable and essential element in the production of tuberculosis, will be also confirmed by those who have time and opportunity to undertake it. It will be remembered that by a process of cultivation extending over many months, with the isolated descendants of the bacilli found in tuberculous tissues, Koch inoculated numerous animals—using over two hundred altogether—and in every case tuberculous bacilli were found in the infected animal.

If the observations be accurate there is only one conclusion—that these bacilli cause tuberculosis.

The Cases are epitomised in two classes: the one in which Tuberculous Bacilli were found, the other in which they were believed to be absent.

CASES IN WHICH TUBERCULOUS BACILLI WERE FOUND:—

No.	Name, Age, &c.	Condition of Lung.	Bacilli.
1.	Miss J. T., 40 years	Chronic Phthisis, 3 years. Much purulent expectoration, cavities both apices.	Abundant.
2.	Lydia L., 32 years ... Ward 2	Paraplegia. Patient wasting and anæmic. Cough, with purulent expectoration. Dulness and cavernous sounds at one apex.	Abundant.
3.	Miss C. C., 20 years	Acute Phthisis. Cough 6 months. Rapid wasting, much purulent expectoration. Cavities in both upper lobes.	Very abundant.
4.	Mr. A. S., 35 years	Early Phthisis, 9 months. Much consolidation of left lung, no breaking down, no pyrexia. Little expectoration.	Abundant.
5.	Mr. F. L., 23 years	Repeated attacks of slight Hæmoptysis. General health good. Small patch of dulness with harsh breathing below right clavicle. Little expectoration.	Numerous.
6.	Mary C., 20 years ... ... Ward 3	Chronic Phthisis, with history of Syphilis. Cough, night sweats, aphonia, crepitation and dulness at both apices.	Found, but not very numerous.
7.	Alice P., 43 years ... ... Ward 4	Chronic Diarrhœa. High temperature, rapid breaking down of both lungs.	Very abundant.

ing down of both lungs.

No.	Name, Age, &c.	Condition of Lung.	Bacilli.
8.	Alice E., 25 years ... ... Ward 4	Chronic Phthisis, 18 months, and Sloughing Tonsils, 6 weeks.	Found in sputum and in mucus from recesses of tonsils. Three months afterwards less numerous, only three or four in a field, and this after prolonged antiseptic inhalations. Tonsils quite well and small.
9.	Mary H., 22 years ... ... Ward 1	Early Phthisis. Small patch of consolidation at one apex. No wasting or temperature.	Numerous.
10.	Henry G., 41 years ... Ward 5 (Dr. Waldo).	Chronic Phthisis. Numerous cavities.	Abundant in lung tissue at P.M.E.
11.	S. B. ... ... Out-patient	Chronic Phthisis	Abundant.
12.	Alice P., 25 years ... ... Ward 2	Chronic Phthisis, with cavities	Abundant.
13.	Henry M., 16 years ... Ward 7	Advanced Phthisis	Abundant.
14.	Henry L., 33 years... ... Ward 7	Early Phthisis, 3 months. Dulness right upper lobe	Abundant.
15.	Ann J., 42 years	Chronic Phthisis	Present.
16.	Thirza W., 55 years ... Ward 4	Chronic Phthisis, with Diabetes	Present, not numerous.
17.	— Morris (Insane patient)	Chronic Phthisis	Large, numerous, but isolated.
18.	Arthur A., 9 years	Acute Phthisis, 3 months. High temperature ...	No expectoration voluntarily, but when obtained bacilli found.
19.	Wm. W., 20 years ... ... Ward 6 (Dr. Shaw).	Syphilis and early Phthisis. Not improved by Iodide of Potassium.	Abundant.
20.	John F., 40 years ... ... Ward 5	Hæmoptysis, 14 years. Cough, 4 years. Emaciation. Cavity at left apex, consolidation at right. Disease not progressive.	Few, mostly small.

No.	Name, Age, &c.	Condition of Lung.	Bacilli.
21.	Emily G., 22 years ... ... Ward 1	Rapid Phthisis, post partum. Death after 6 weeks' illness. Cavity in right apex, copious disseminated tubercles.	Imperfect evidences from defective staining.
22.	— Brockley ... ... Out-patient	Chronic Phthisis	Numerous.
23.	Rev. J. K., 40 years	Small patch of dulness at one apex. Feels quite well and at work.	Abundant.
24.	John C., 44 years ... ... Ward 6	Chronic Phthisis, 4 years	Few.
25.	Wm. W., 25 years ... ... Ward 5	Chronic Phthisis, 9 years	Present, but not numerous.
26.	Michael D., 50 years ... Ward 7	Chronic Cough, wasting, 4 years...	Very few.
27.	Maria B., 18 years	Chronic Phthisis, 4 years. Dulness at one apex ...	Abundant.
28.	Lewis S., 26 years ... ... Ward 7	Ill four months. Cough, wasting, diarrhœa. Dulness whole of left side. Died in two weeks.	Numerous.
29.	— Taylor .. .. Out-patient	Phthisis, 6 months	Abundant.
30.	James L., 42 years ... ... Ward 7	Case simulating Chronic Bronchitis. Re-examination of chest showed dulness at right upper lobe. Pyrexia and rapid breaking down ensued in spite of antiseptic inhalations.	Sputum found to contain numerous bacilli. Six weeks later bacilli as numerous as before. P. M. E.—Lung riddled with cavities, mucus in them crowded with bac. in groups and masses.
31.	Mark W. ... . Out-patient	Chronic Phthisis	Abundant.
32.	Annie K., 24 years...	Acute Phthisis. Phthisical Dyspepsia, 6 months. Rapid wasting, breaking down at both apices.	Very numerous.
33.	Emma H., 48 years ... Ward 2	Chronic Phthisis, 5 years. No active symptoms ...	Not numerous, small and ill-formed.

No.	Name, Age, &c.	Condition of Lung.	Bacilli.
34.	Charles A., 29 years ... Ward 6	Bronchitis. Pyrexia ensued, and condensation at right apex; afterwards severe tonsillitis, much benefited by iodoform. Expectoration ceased entirely and patient gained in weight.	Sputum found to contain bacilli, not numerous but large. No bacilli in last specimen of sputum, apex clearing.
35.	Wm. C. ... ... Ward 8	Chronic Phthisis	Abundant.
36.	T. H.	Chronic Phthisis	Abundant and large.
37.	— Thomas, 23 years	Chronic Phthisis	Decided, but not very numerous, large, well formed, occasional groups.
38.	— Hill ... ... Ward 3	Chronic Phthisis	Numerous, in groups.
39.	E. W., 19 years	Chronic Cystitis. Acute Pulmonary Tuberculosis...	In urine. Very numerous in sputum.
40.	— Hanks	(Post-mortem examination). Numerous cavities ...	Lining of cavity crowded with groups and large masses.
41.	John W., 30 years	Acute Phthisis, 6 months. Cavities	Very abundant.
42.	Wm. R., 59 years ... Out-patient	Chronic Fibroid Phthisis. Hæmoptysis, 6 years ago. Cough ever since. Much condensation of left lung.	Numerous.
43.	— Wright... ... ... Ward 8	Chronic Phthisis	Moderate number.
44.	— Pates	(P.M.E.) Caseous lining of cavity in lungs	Masses aggregated together.
45.	— Beachim ... ... Out-patient	Chronic Phthisis	Numerous.
46.	John P., 23 years ... ... Ward 6	Phthisis, 1 month. Dulness and crepitation at one apex. Improved with Iodoform.	Abundant.
47.	Allan M., 32 years ... Ward 7	Chronic Phthisis, 11 months. Aphonia, 5 months. Much consolidation of left lung. No temperature.	Not numerous, short and small.
48.	Miss O., 23 years	Phthisis, 12 months. No expectoration ordinarily. Severe diarrhœa, 2 months.	Numerous in sputum, and also in fæces.
49.	— Kelly, 45 years ... ... Ward 7	Albumenuria, degenerated arteries, debility, temperature. Dulness at one apex.	Present, but small and not numerous.

CASES IN WHICH NO TUBERCULOUS BACILLI WERE FOUND:—

No.	Name, Age, &c.	Condition of Lung.	Bacilli.
1.	Margaret L., 48 years	Emphysema, dilated bronchi, cavities, dilated right heart, &c. No tubercles.	None.
2.	James B., 34 years ... ... Ward 7	Chronic Syphilitic Pneumonia. Cavity in base, drainage tube. Occasional bronchitis. Much muco-purulent sputum.	None.
3.	Lewis J. ... ... Ward 7	Chronic Bronchitis	None.
4.	— Collingbourne ... Out-patient	Said to have Hæmoptysis. No evidence of any lung disease.	None.
5.	Rev. P. K., 30 years	Chronic Pleuro-pneumonia, 12 months. Much dulness at right base, apex sounds normal. Copious purulent expectoration. Nails clubbed. Family history of Phthisis. Occasional Albumenuria. Liver a little enlarged.	None.
6.	Charlotte K., Sister to above, 26 years.	Chronic Left Pleurisy, 2 years. Persistent Cough. No wasting or Hæmoptysis. Slight dulness over whole of left lung, moist sounds over whole of left side. A little non-purulent expectoration.	None.
7.	Wm. R., 58 years ... ... Ward 8	Apex-pneumonia. Lung breaking down. Cavity. Purulent expectoration. Gangrene.	None.
8.	— Sanders	Chronic Bronchitis	None.
9.	Rev. J. B., Father to case of Phthisis No. 27.	Chronic Bronchitis, much muco-pus	None.
10.	John S., 32 years	Secondary Sarcoma of Lung...	None.

No.	Name Age, &c.	Condition of Lung.	Bacilli.
11.	— Harris	Chronic Bronchitis	None.
12.	A. B.	Case of Pneumonia, grey hepatisation	None.
13.	— Stonelake, 10 years	Bronchitis. Debility	None.
14.	— Hayward, 15 years ... Ward 3	Mitral Disease. Bronchial mucus. Double Pneumonia	None.
15.	Selina S., 32 years ... ... Ward 2	Bronchitis. Rapid convalescence	None.
16.	Harriet S., 32 years ... Ward 4	Bronchitis, much muco-pus	None.
17.	— Batten	Chronic Bronchitis	None.
18.	Mrs. M., 65 years	Case of Diabetes. Bronchitis. Thick purulent nummular sputum. Speedy recovery.	None.
19.	— Lovell, 35 years ... ... Ward 2	Repeated attacks of Bronchitis. Some condensation of left lung. Morbid growth.	None.
20.	— Tucker...	Chronic Bronchitis	None.
21.	Miss J. Mac, 17 years	Family history of Phthisis. Pyrexia, much crepitation in both lungs. Copious purulent expectoration.	None.
22.	Miss H. W.	Family history of Phthisis. Chronic cough, purulent expectoration. No dulness.	None.
23.	Maria W., 18 years... ... Ward 2	History simulating Phthisis. Patient rapidly convalesced.	None.
24.	Mr. W., 50 years	Chronic Pneumonia. No expectoration	None.
25.	Frank S., 21 years ... ... Ward 5	Bronchitis. Asthma, 9 months	None.
26.	E. H., 44 years ... Out-patient	Bronchitis...	None.
27.	Henry Y., 50 years...	Chronic Bronchitis	None.
28.	A. B. G., 61 years	Mitral Disease. Cough and expectoration. Patient much emaciated.	None.

CLINICAL EVIDENCE AGAINST THE CONTAGIOUSNESS OF PHTHISIS,

BY

E. MARKHAM SKERRITT, M.D. Lond.,
B.S., B.A., M.R.C.P.;

Fellow of University College, London; Lecturer on Medicine at the Bristol Medical School; Physician to the Bristol General Hospital.

PERHAPS no recent discovery in the domain of the science of medicine has excited so great interest as the demonstration by Koch of the existence of the *bacillus tuberculosis*, and his announcement of the results obtained in animals by inoculation of the organism. It may be assumed that most clinical observers have satisfied themselves of the association of the bacillus with phthisis; but opinion differs as to the relationship existing between this organism and the disease. Some hold that the bacillus is the exciting cause of the morbid state; and, further, accepting to the full the conclusions drawn by Koch from his experiments, are convinced that tuberculosis is contagious, and that the bacillus is the active agent in its transmission. It has been pointed out, however, that this organism may be associated with tubercular lesions without necessarily causing them—just as smoke is associated with fire, and is therefore of value in its diagnosis, though it does not cause it. Again, if further observations accord with the results of Koch's experiments (which as yet have not been fully confirmed), if it be thus established that the disease is caused by the bacillus, even then it does not follow that

it is contagious. Malarial fever is known not to be capable of transfer from man to man, and yet the observations of Klebs, Crudeli, and Rozsahegyi go to prove that the disease is associated with the presence of a special bacillus, and that it can be conveyed from man to the lower animals (monkeys, rabbits and dogs) by inoculation of this bacterium.

Thus the question of the contagiousness of phthisis remains untouched by the discovery of the bacillus; and the theories which have been based upon its existence must be examined, not only from the point of view of experiments on animals, but also in the light of clinical observation. The object of this paper is to discuss from the standpoint of practical experience certain difficulties that exist in the way of the unreserved acceptance of the theory that phthisis is contagious. (It will be noted that phthisis is regarded as of tubercular origin, inasmuch as the recent observations tend to confirm the belief in the unity of phthisis with tuberculosis, which has always been held by many eminent authorities.)

The subject may be considered under the following heads:—

1.—The positive evidence in favour of the conveyance of phthisis by contagion.

2.—The negative evidence against it.

3.—Certain points of difference between phthisis and other diseases which have long been known to be contagious.

4.—Certain difficulties arising from the grouping together of affections that exhibit clinical divergencies.

5.—The bearing of the results of certain modes of treatment of phthisis upon the question under consideration.

I. *The positive evidence in favour of the conveyance of phthisis by contagion.*—It has fallen to the lot of most observers to meet with instances of the occurrence of phthisis under conditions such as to be in accordance with the theory of contagion, and especially in the case of association of individuals by marriage. It is, however, evident that phthisis is so common a disease that, on a mere calculation of probabilities, it is plain that a certain number of men who are destined to become phthisical will marry women who will also develop the disease. According to an estimate made by Dr. Beddoe, one in every seven or eight young married men has a wife who will die of phthisis. As the chances, therefore, are very much against the simultaneous onset of the disease in husband and wife, one of the two will first become phthisical, and the disease will appear in the other at some later period. And further, it is not unlikely that in such a case the concomitant circumstances of trouble and anxiety and close attendance upon the patient will be such as then to determine the onset of the malady to which the second of the pair is already doomed. It must also be remembered that the same depressing external conditions which bring on the disease in one predisposed person are very likely to do so in another, and that husband and wife are to a great extent exposed to the same injurious influences.

Leudet* gives the following statistics, respecting 56 families of the better classes, in favour of the doctrine of contagion:—Fifteen husbands were phthisical at marriage, five of the wives became affected; but of these two had relatives dying of phthisis, and one was well until *ten years* after her husband's death, so that three cases out of the

* *International Congress of Hygiene, Geneva*, 1882.

five must be excluded as dqubtful. Forty-one wives were phthisical at marriage, and three of the husbands became phthisical; but here, too, one must be excluded who had lost a sister from the disease. The statistics therefore stand thus:—Two wives only out of fifteen, and two husbands out of forty-one became phthisical; a result which, according to Dr. Beddoe's estimate, it is not necessary to attribute to contagion. He further gave these details with regard to the children of the women married to phthisical husbands. Of the five wives who became phthisical after marriage, four had children, but only one lost any from tuberculosis; of the ten wives who escaped, nine had children, and five lost one or more from phthisis; so that the healthy mothers lost the most children from phthisis. Surely the fact that when both parents were phthisical fewer children suffered from the disease than when one only was affected is strong evidence against the supposition that contagion was at work; inasmuch as with a phthisical predisposition derived from both parents, and a phthisical mother to supply the specific germs, a child is evidently far more likely to fall a prey to the specific contagion than it is if the father alone is tubercular.

Poulet* records that, out of 64 cases in which one of the married couple died of phthisis at the age of fecundity, there were only two instances in which the other partner became phthisical—and in these two the disease appeared after a lapse of time and with a history of predisposition which excluded all idea of contagion.

An illustration of the fallacies to which accidental association may lead lately came under the notice of the author at the Bristol General Hospital. A man distinctly phthisical stated that he had become ill since the death of

* *Le Concours Méd.*, November, 1882.

his wife from consumption; his own family history he had no accurate knowledge of, but he was not aware that any tendency to phthisis existed. On investigation, however, it was found that the patient had enjoyed perfect health for about four years after his wife's death. If the man had chanced to become phthisical several years earlier, the case might have been quoted as another in support of the theory of contagion through marriage.

A very telling instance is narrated by Dr. W. Dale, of Lynn.* A healthy man and wife, living in a small lonely house in the country, had a family of seven apparently strong daughters and one son; two daughters were school teachers in distant places apart; two were married and also distant and living apart; and the rest lived at home. One of the teachers came home phthisical and died; after her death the youngest daughter had a severe attack of chorea, then fell a prey to acute phthisis; during her illness the other daughter engaged in teaching was brought home phthisical; a fourth daughter, living at home, was reduced by severe dyspepsia, became phthisical and died; and lastly, one of the married daughters, living under depressing conditions at a distance, developed the same disease and died. It appeared that the father had lost sisters of consumption. Dr. Dale well says that if all these cases had occurred in the same house they would have been claimed as indubitable evidence of infection.

Numerically, the cases in which contagion has been suspected of being the cause of phthisis bear a very small proportion indeed to the whole number of instances of the disease. Thus, Dr. Reginald Thompson† has met with 15 such out of 15,000; Dr. Flint with 2 cases out of

* *Lancet*, December 24th, 1881. † *Ibid*, November 6th, 1880.

690; Dr. Richardson, no cases out of 3,000. The instances brought forward by Dr. Weber in 1864 are worthy of note, especially the remarkable case of a phthisical patient who had four wives in succession die of phthisis, he himself living through it all; but it has been suggested that the disease actually at work here may have been syphilis. Cases the reverse of this, however, must be allowed full weight—as, for example, when a man has had two or even three wives successively destroyed by phthisis, he himself wholly escaping; this was long ago insisted upon by Portal.

There is one feature in some of the cases of supposed contagion between husband and wife that cannot fail to attract attention. In a certain number of the instances recorded the husband, for instance, who has developed phthisis while the wife has been dying of the disease, has made a good recovery within a comparatively short time after her death.* This is not in accordance with the progressive course of ordinary phthisis, when such a result would be very much more exceptional. Dr. Reginald Thompson† says, in speaking of such a case:—"If it had not been for previous experience of similar cases . . . I should have almost despaired of a favourable termination. . . . However, the patient improved, the physical signs cleared away, and in four months she was restored to health."

In the able paper referred to, Dr. Thompson adduces evidence in support of the view that such cases of apparent contagion are in reality of pyæmic origin, and not truly phthisical—evidence derived both from the special clinical features of the disease, which differ in

* Walsh, *Diseases of the Lungs*, 4th ed., p. 460; Reginald Thompson, loc. cit.

† Loc. cit.

many points from those of ordinary phthisis and approximate to the pyæmic type, and also from the *post mortem* appearances in one instance, where the lungs presented the characters met with in infective pneumonia,—Dr. Klein, who also examined the specimens, concurring in this opinion. Dr. Thompson says, "if further observation corroborates this evidence, it will, I think, lead to the conclusion that phthisis, in its power of communicating disease, must be looked upon, not as a zymotic disease capable of sowing itself . . . but rather as an ulcerative process capable of giving rise to pyæmia."

Many of the later features in a case of ordinary phthisis must be attributed to the septicæmic condition induced by the putrefaction which occurs in the breaking-down lung. "The thermic curves are not those of inflammatory reaction, but of putrid infection; in the pyrexial form of phthisis the evening exacerbation of temperature is due, not to a pneumonic process, but to resorption of the softened material."*

One case has been placed on record in which tuberculosis was believed to have been conveyed to a man by inoculation; but an isolated instance such as this is of no practical importance, as much wider observation would be needed before the conclusion would be warranted that the occurrence was necessarily more than a mere coincidence. Against this, also, may be set the experiments in inoculation which must have been performed inadvertently times without number during attendance upon phthisical patients and at *post mortem* examinations of those who have died of the disease, and with negative results. It is true that Laennec believed that a small nodule which appeared on his finger was a tubercular growth, the effect

* Charcot.

of inoculation; but there was no further evidence to prove that this was anything more than a simple inflammatory induration excited by the puncture. If tubercle were inoculable with such absolute certainty as Koch's experiments would indicate, a *post mortem* wound in the examination of a phthisical lung ought to be followed by the development of the disease at least as frequently as a similar inoculation with putrid matter results in blood-poisoning.

II. *Negative evidence against the contagiousness of phthisis.*—Under this heading is included the evidence that phthisis has shown no tendency to spread under certain circumstances most favourable to the development of a contagious disease.

Foremost must be placed the statistics of the Brompton Consumption Hospital. These are of so much importance that they are quoted *in extenso* as given by Dr. Pollock, Consulting Physician to the Hospital, in the Croonian Lectures for the present year on Modern Theories and Treatment of Phthisis.* The hospital has been open 36 years; it contains 240 beds. Three-fourths of the cases treated are phthisis in all stages. In the earlier years the ventilation was very faulty; the dispensary rooms were bad, and were in direct communication with the out-patient department, where from 200 to 300 consumptive patients attended daily:—

"The residents in the hospital comprise medical officer, lady superintendent, four clinical assistants (who reside for six months), sisters, nurses, and servants. All the resident medical officers are now alive, and all the matrons but one, who died in advanced age. About 150 clinical assistants have held office—eight of them are known to

* *Lancet*, April 28th, 1883.

have had consumption, generally at long periods after leaving the hospital, but none had it while resident; one had hæmoptysis before coming into residence, and in only one instance was it clearly proved that the disease was contracted in the hospital. The sisters sleep in rooms communicating with the wards and galleries, and have a system of ventilation common to the patients. The nurses sleep in rooms above the wards, but of course are all day in attendance upon the sick. In the course of 36 years only one had consumption while in the hospital. Three died of phthisis some time after leaving the hospital, two of whom were attacked many years after. Since 1867 there have been 101 nurses, of whom one died of phthisis some time after leaving. The gallery-maids scrub the wards daily. We have had 32 since 1867, but no case of phthisis occurred. Of porters, most of whom had to work in the dead-room, we have had 20, none of whom had phthisis. Of dispensers we have had 22; among them three cases of phthisis, one of whom only was ill while in the hospital; the other two contracted the disease after leaving—one from intemperate habits. There have been 29 physicians and assistant-physicians, of whom eight have died; only one died of consumption, which he had contracted before his appointment. There have been four chaplains, and nine persons in the secretary's office, but no phthisis among them."

Once a severe outbreak of erysipelas and hospital sore-throat occurred in several of Dr. Pollock's wards, when it was found that for some time there had been practically no ventilation of these wards. And yet, although they must have been living in an atmosphere teeming with the *bacillus tuberculosis*, there was an outbreak of erysipelas amongst the nurses and attendants, but no phthisis.

Compare these results with the statistics of special fever hospitals:—"Nurses in hospitals where many cases of typhus are received invariably get typhus, no matter under what sanitary conditions they are placed. There appears to be no exception to this rule. Medical men and Catholic priests in attendance upon numerous typhus cases are also almost sure, sooner or later, to get the fever."*

Next to nurses and attendants on the sick, there are none who by their occupation are more exposed to the risk of infection than are medical men. During the examination of a phthisical patient, the physician must frequently breathe his bacillus-carrying exhalations, together with chance particles of sputum expelled by cough. In spite of this, however, medical men do not suffer from phthisis in an unusual degree, and enjoy a greater immunity from the disease than do editors, dentists, architects, and public officers.†

Again, it must have fallen to the lot of all medical practitioners to witness cases in which patients dying of phthisis have been most attentively nursed by their near relatives (who presumably share any inherited predisposition that exists) under circumstances the most favourable for the occurrence of infection, with a negative result. Dr. Pollock says,‡ "I have seen many instances in which the most assiduous personal nursing of the sick, living in

* *Reynolds' System of Medicine*, Art. "Typhus Fever," by G. Buchanan, M.D.

† The following extract is from the statistics derived from records of the examination for military service in the armies of the United States during the late war of the Rebellion, of over a million men, compiled by J. H. Baxter, M.D.:—Washington, 1875.—*Rejections for phthisis per 1000 examined.*—Editors, 82.192; dentists, 65.116; architects, 63.492; public officers, 61.611; medical men, 60.729.

‡ Loc. cit.

the same room, sleeping in the same bed, and undergoing the same influences of air and lodging, of anxiety and harrass, as the sick, has failed to produce it. There have been waste of flesh and strength, loss of sleep and appetite, and all the evidences of depressed vital powers in numerous cases, but no phthisis. This, too, has occurred again and again where an inherited taint has rendered the disease most probable to invade."

III. *Certain points of difference between phthisis and other diseases which are known to be contagious.*—Of these, one of the most marked is with regard to liability to contagion, or what is commonly spoken of as *predisposition*. Those who believe in the contagiousness of phthisis, equally with those who consider it as yet "not proven," agree in this, that there is a wide divergence between phthisis and other contagious diseases with respect to its power of attack. For although, strictly speaking, a "predisposition" of body is necessary to the attack of *any* infectious disorder, yet practically it may be said that the congenial soil for the development of diseases such as typhus and typhoid fevers, scarlet fever, syphilis, and the animal poisons (as farcy and anthrax) is the *healthy system*. With phthisis, however, it is far otherwise. For if phthisis were actively contagious from man to man as are scarlet fever and syphilis, it must long ago have established its right to be classed with them amongst diseases which spread by contagion. This, indeed, appears to be a serious difficulty when the attempt is made to reconcile the results of experiments on animals with the outcome of clinical observation. For, according to these experiments, tuberculosis is inoculable, *and also communicable by inhalation of air containing the special contagium*, with the greatest certainty in the case of all animals hitherto subjected to

trial—in the case of those which are not prone to spontaneous tuberculosis equally with those that have a strong tendency to its development—so that tuberculosis should be as certainly contagious as are anthrax and syphilis. Clinically, it is known that this is not the case, that air containing the products of phthisis is inhaled constantly without infection resulting, and that instances of chance inoculation must frequently arise and with negative result.

It must be allowed, then, that phthisis, if a contagious disease, differs from all others of the same class in being unable to attack those who are not peculiarly vulnerable —that, unlike the rest of the group, it requires a very specially prepared soil in which to take root, and that it will flourish in no other. And further, that this clinical fact is diametrically opposed to the results obtained by experiments on animals.

As an illustration of this point, reference may be made to cases where persons have been intimately associated—often for long periods—with phthisical patients without the development of the disease, and years afterwards have become phthisical—as in the two cases before referred to (p. 51), in one of which phthisis attacked a man four years after the death of his wife from the disease, and in the other a woman became consumptive ten years after the death of her husband from the same cause. In such cases there has been an intimate and prolonged exposure to any contagium that may exist, but with negative result; and yet, after an interval of time that precludes the possibility of infection, the same disease has developed in the survivor. If a man had been subjected in anything like a similar degree to the poison of scarlet fever, small pox, syphilis, or farcy, and notwithstanding had proved his insusceptibility to it, it is not within the bounds

of probability that he would afterwards succumb to its attack.

In favour of the infectious nature of the disease it is said that, like the recognised zymotics, phthisis is much more prevalent amongst crowded communities, as in convents, barracks, and penitentiaries, than it is under opposite conditions, and that it is therefore most met with where, if contagious, it would have the best opportunity of spreading. This argument, however, tells with equal force against the theory of contagion. For nothing is more potent in bringing out existing tendencies to disease, or in developing morbid conditions due to malnutrition, than the influence of just such unhygienic conditions of life as exist in crowded communities; and it might be urged with equal force that rickets and anæmia were contagious, because they were chiefly found under similar conditions.

On closer investigation of the occupations which are more especially associated with the onset of phthisis, it will be seen that they involve the passing of a large portion of life in confined spaces, although this may not entail any actual overcrowding and therefore undue exposure to contact with phthisical persons. A reference to the statistics of the United States War Office already referred to* shows that the largest per-centage of rejections for phthisis occurred in the case of *editors*, who lead a sedentary and confined life, commonly working in rooms badly ventilated and over-heated, but who are certainly not "overcrowded" by their fellow-creatures. Far below these in the proportion of rejections for phthisis come those who work amongst somewhat similar surroundings, but *in addition* are liable to the risk of overcrowding, with the attendant greater exposure to contagion. Thus,

* See Note, p. 57.

although the rejections of editors per 1000 for phthisis were 82.192, those of bookbinders were only 24.930, of printers 21.325, and of engravers 18.405 respectively. The tables also indicate that the professions as a whole, where the element of mental strain exists to a special degree, afford a much larger per-centage of cases of phthisis than do even occupations which from their nature are commonly regarded as unhealthy, and in which the factor of overcrowding greatly increases any risk from contagion.

In a valuable paper on Phthisis in Birds, read at a recent meeting of the Bristol Medico-Chirurgical Society, Mr. G. Munro Smith states as the result of his observations on canaries that the so-called "Belgians," in which a special deformity of chest is intentionally perpetuated, when kept in confinement are almost certain to fall victims to a chronic destructive disease of the lungs; that this appears more readily if the birds are kept together (that is to say, overcrowded), but that it will arise even when complete isolation is secured; while canaries of other breeds and free from the deformity do not acquire the disease. He considers this to be the phthisis of these birds, and holds that its clinical characteristics and its *post mortem* appearances are such as to distinguish it from acute tuberculosis, to which canaries of all breeds are equally liable. These observations in comparative pathology are of much importance, as showing that, in the case of a disease which is similar to phthisis in man, and to which a strong predisposition exists, the morbid changes are developed when the element of contagion is excluded.

In a communication to the Epidemiological Society on the 4th of last April, Dr. Longstaff exhibited charts (compiled from the returns of the Registrar-General for

England and Wales) showing that the death-rate curve of phthisis—unlike those of the zymotic diseases—deviates very little from a straight line; thus resembling those of cancer, apoplexy, paralysis, convulsions and fractures. The curve of tubercular meningitis resembles it, as does (to a less degree) that of tabes mesenterica. He concludes that the mortality statistics of England and Wales afford no evidence of the contagiousness of phthisis.

Dr. Longstaff notes also the fact that during the last twenty years the death-rate from phthisis has fallen 20 *per cent.*, while there has not been a corresponding decrease in the case of those diseases which have been recognised as due to infection. This indicates that the advances made by sanitary science during that period have affected phthisis to a very special degree, and it has been proved that this diminished mortality from the disease is chiefly due to the drying of the surface of the ground and of the subsoil. In his report to the Privy Council* on the results of public works of improvement in large towns, Dr. Buchanan considers more especially the improvements which have been effected in the following respects:—In the drainage, especially of the surface; in the water supply; in the removal of excreta; in street scavenging; in the diminution of overcrowding and the enforcing of ventilation. It was found that the total mortality of towns was considerably diminished, that from the zymotic diseases included; but that the death-rate from phthisis was in many cases lowered out of all proportion. For example, at Salisbury the mortality from phthisis was as follows:—before the improvements, 44.3 per 10,000; after, 22; At Ely, before, 33 *per cent.* of all deaths were due to phthisis; after, only 16 *per cent.*

* Ninth Report to the Privy Council, by G. Buchanan, M.D.

Further, the special change to which this was referred was the *drying of the surface and the subsoil*, diminution in the death-rate from phthisis being constantly proportionate to the improvement effected in this special particular; so much so that, in several places where alterations were made in other respects but no improvement in the surface drainage could be effected, the mortality from phthisis remained as before.

It is not easy to explain these facts on the hypothesis that phthisis is infectious. There is no reason to suppose that the contagium of the disease is harboured by the soil and undergoes development in it. On the contrary, Koch's observations on the *bacillus tuberculosis* tend to show that this organism exhibits no vitality except at the temperature of the body. The only theory which can be suggested on this supposition is that exposure to damp brings the system into a state in which it proves a suitable *nidus* for the development of the contagium, so that dwellers in districts where the surface and the subsoil are insufficiently drained would fall an easy prey to the *bacillus tuberculosis*. The opponents of the theory of infection, however, consider that the interposition of the bacillus is unnecessary, and that unhealthy conditions are of themselves sufficient to excite the disease in those who are predisposed to it.

Again, a survey of the course of the disease after it has become established cannot but indicate the differences that exist between phthisis and the known zymotic diseases. Phthisis is noted for what may be called the eccentricity of its behaviour. In one case its progress will be steadily onwards to death, extending, it may be, over years, but always advancing; in another it will run its whole course within a few weeks; in another it will be

checked in its career, and will altogether die out, the patient being practically cured; in yet another it will make a certain amount of progress, and then will become quiescent for a longer or shorter time, after which it will again advance; and the history of the disease may be one extending over many years, and characterised by marked irregularity of progress, by many exacerbations and remissions, but ultimately ending in death. Contrast this with the history of typhus fever or of variola; or even of glanders or farcy, which is, in its chronic form, one of the most prolonged of the contagious diseases, but which in any case runs a steady course, and ends definitely either in death or in complete and permanent recovery. The history of syphilis affords a much closer resemblance to that of phthisis in its chronicity, the uncertain duration of its lesions, and the tendency to recurrence of its manifestations; but it must be noted that this is more especially the case with reference to the tertiary stage of the disease, the phenomena of which are by some authorities considered to be sequelae of the malady rather than an integral part of it.*

IV. *Certain difficulties arising from the grouping together of affections that exhibit clinical divergencies.*—Space does not permit of a detailed consideration of the various diffi-

* It is hardly necessary to point out, in reply to an argument that is sometimes used, that similarity in the minute structure of neoplasms does not necessarily imply similarity in the exciting causes—that tuberculosis is not necessarily contagious because its new growths, like those of farcy and glanders, belong to the group of granulomata, any more than simple inflammation is contagious because it leads to the formation of the granulation tissue which is the type of the granulomata. Nor is it any more logical to draw an analogy between acute tuberculosis and typhoid fever because clinically cases occur in which it is almost impossible to distinguish between them, than it is to group together acute tuberculosis and the other and varied morbid conditions which it may simulate in turn.

culties attendant upon the unreserved acceptance of the conclusions based upon Koch's experiments, by which is necessitated the grouping together of conditions differing widely in their clinical history. Acute miliary tuberculosis and strumous enlargement of lymphatic glands, chronic pulmonary phthisis, strumous synovial degeneration of joints, and the pearl-disease of cattle, are all, according to Koch, convertible terms of the same disease, are all due to one and the same contagium.

It would be possible to indicate many points—such as the morphological distinctions between human tuberculosis and pearl-disease, as insisted upon by Dr. Creighton,* and, later, by Schottelius; the sequence of acute tuberculosis upon old-standing strumous joint disease or caries of the spine in one case—the strict and permanent localisation of the disease in an affected joint in another, although the extensive secondary lardaceous degeneration of internal organs shows the profound influence of the malady upon the system—the extreme rarity of the occurrence of strumous joint disease as a complication of phthisis; it were easy to multiply such illustrations of the practical difficulties to which the theory of the unity of these various conditions gives rise.

V. *The bearing upon the question under consideration of the results of certain methods of treatment.*—Brief reference may here be made to an argument that has been derived from the supposed effects of two modes of treatment directed against the bacillus of tubercle—the treatment by antiseptic inhalations, and the treatment by residence at high altitudes.

First, with regard to the inhalation of antiseptics, such as creasote and carbolic acid. In spite of the assertions

* Bovine Tuberculosis in Man, by C. Creighton, M.D. 1881.

of some observers, it has not been established that this method of treatment has any power in controlling the progress of phthisis. And indeed it is not likely that any material effect can be produced upon organisms which exist in the air-spaces (let alone those in the tissue of the lung itself), when the very slight degree of volatility of the substances employed is borne in mind.*

Again, with reference to the influence on phthisis of residence at high altitudes, there is much discrepancy of opinion. It must be remembered that the rare occurrence of the disease amongst the inhabitants of such regions has no immediate bearing upon the question, inasmuch as in the case of established phthisis the specific germs are supposed to be present in the lungs already; and the theory that the pure air is fatal to the bacilli that exist in the tissues is not sound, as viewed in the light of "Listerism." For it is well known that, when putrid decomposition has once set in, a wound cannot be made aseptic even though kept in an atmosphere of carbolic acid, and that the thorough application of a strong solution can alone be relied upon to secure the desired result. Pure air alone is not an efficient germicide; the germs already in possession must be destroyed, and then, if none exist in the locality, no more will be introduced.

* Dr. Hill Hassall has shown [*Lancet*, May 5th, 1883] that carbolic acid and creasote, the substances most commonly used for inhalation, are but very slightly volatile at ordinary temperatures; and that even iodine, which is a much more active disinfectant, becomes converted into an inert iodide before it can reach the ultimate lung-structure. Further, Dr. Baxter has proved [*Report on Disinfectants, Public Health Reports of the Local Government Board, 1875*] that 2 °/₀ of pure carbolic acid must be added to vaccine in order to destroy its power, and that the same amount is also necessary in the case of the virus of glanders; so that, supposing the tubercular poison to have the same power of resistance, in order to destroy the bacilli in any portion of sputum it would be necessary to add to it an equal quantity of a 1-in-25 solution of carbolic acid.

The following fact, however, is often overlooked:—that, although phthisis is rare at high altitudes, yet "*tuberculous deposition is by no means very uncommon in certain other organs of natives of the highest habitable regions.*"* This tends to show that the rarity of pulmonary phthisis amongst the inhabitants of such altitudes is due to the massy normal development of the lungs, which endows these organs, the favourite seat of the disease, with a greater power of resistance, rather than to the absence of tuberculosis from those regions. This is in accordance with the fact that musicians who play wind instruments, and in whom the capacity of the chest becomes unusually great, are peculiarly exempt from phthisis. In the statistics of the United States armies before referred to the rejections of musicians per 1000 for this disease were only 12.049, as against the 82.192 of editors.

It has been said that favourite health resorts become "contaminated" by the crowding of cases of phthisis; but there is not sufficient evidence to show that their apparent deterioration is due to any other cause than non-specific overcrowding with its usual unsanitary concomitants; and it must also be borne in mind that when a health resort becomes "fashionable" patients in all stages of disease will flock to it without reference to its special fitness for their individual condition, and that the reputation of the locality suffers in consequence.

A detailed consideration of the results which have been obtained by experiments on animals, and a discussion of the conclusions which have been drawn from them as to the exact relationship of the bacillus to tuberculosis, are not within the scope of this paper. It may, however,

* Walsh, loc. cit., p. 465.

be pointed out that it is not safe to reason directly from the lower animals to man, or even from animals to animals. For a fungus which kills one species of mouse is entirely inactive in another;* mice are highly susceptible to anthrax, while rats enjoy almost complete immunity from it; the herbivora as a whole are very prone to anthrax, whereas in the carnivora it cannot be induced, even by inoculation, with any certainty; the so-called rabbit-septicæmia is very fatal to rabbits and mice, while guinea-pigs and rats are not in any way affected by it; inoculations from relapsing fever have been successful only in monkeys; and even human saliva, injected into rabbits, causes a form of septicæmia.†

Further, there are important discrepancies between the results obtained by different observers. For example, in his celebrated observations on the induction of tuberculosis in dogs by the inhalation of phthisical sputa, Tappeiner made his "control" animals, for the sake of comparison, inhale the material from *strumous glands*, and in every case without the production of tuberculosis. And Carl Salomonsen,‡ in a series of inoculations with "non-tubercular matter giving negative results," includes two experiments with matter from a *caseous gland from a scrofulous child*. In all these cases, however, tuberculosis should have been produced, inasmuch as the material used for inhalation in the one series and for inoculation in the other contained, according to Koch, the specific *bacillus tuberculosis*. Vargunin, indeed, has made dogs inhale atomised phthisical sputa, emphysematous sputa, and suspended mechanical matter, with similar results in all;

* Koch. † Raynaud, Pasteur.

‡ Quoted by Watson Cheyne in his Report to the Association for the Advancement of Medicine by Research, on the Relation of Micro-organisms to Phthisis, *Practitioner*, April, 1883.

that is, the induction of simple disseminated broncho-pneumonia, without any indication of the existence of an infectious disease.

Again, evidence varies widely as to the constancy of the association of the bacillus with phthisical lesions and its relation to the progress of the disease. According to some observers, this organism is always present in tubercular growths, and its numbers are proportionate to the severity of the condition existing; according to others, the bacillus has not been found in a certain number of instances,* and in any case it is by no means necessarily present in proportion to the amount of tubercular disease. The general body of evidence goes to show that the organism is chiefly met with in caseous matter—that is, where the products of tuberculosis have undergone degeneration; and it has not yet been proved that it is the cause of the disease, rather than a concomitant which finds in tubercular tissue a congenial soil for its growth.†

The diagnostic value of the bacillus depends upon its distinctive reactions to colouring-matters, as insisted upon by Koch. This observer himself, however, allows that the bacteria of leprosy take the same stain; Cramer and Lichtheim have found bacilli in healthy stools with the same colour-reaction. Finkler and Eichler state that other bacilli, not tubercular, behave in the same way; and that even nuclei, if not kept too long in the acid, may regain the blue colour after washing in distilled water. Lastly, Spina, Stricker's assistant at Vienna, states that

* The assumption made by Watson Cheyne (loc. cit.) that only those structures are true tubercle in which the bacillus exists appears to be a begging of the question.

† The supposed *micrococcus gonorrhœæ* has been shown to be nothing but the *micrococcus ureæ*.

putrefactive bacteria stain with Koch's reagents; and this fact is vouched for by no less an authority than Stricker himself. This, if true, "destroys the main argument advanced by Koch in favour of the specific character of the tubercle-bacillus."

Conclusions.

1. That evidence derived from experiments upon the lower animals must be received with caution; and that it does not follow that a disease which is contagious in these animals is contagious also in man.

2. That it has not been conclusively proved that the bacillus is the cause of tuberculosis rather than associated with it as a secondary phenomenon. And further, that if the disease be shown to be due to the bacillus, even then it is not necessarily contagious; as malarial fever is not contagious, although it has been induced by inoculation of an associated organism.

3. That clinical experience is strongly opposed to the theory that phthisis is a contagious disease in the ordinary sense of the term.

4. That there is not sufficient evidence of the actual occurrence of phthisis in man by contagion.

The contagiousness of phthisis is as yet "not proven;" and it behoves the scientific observer not only to listen to the arguments which are adduced in support of an attractive theory, but also to give due consideration to the weighty evidence to which this theory is opposed.

THE CARDIOGRAPH IN MEDICINE.

BY

G. MUNRO SMITH, L.R.C.P. Lond., M.R.C.S.,

Physiological Demonstrator at the Bristol Medical School.

THE cardiograph is often spoken of as a "scientific toy," whose proper place is the physiological laboratory, where its tubes, levers, and bright brass cylinder and clock work add considerably to the appearance of the room, and help to amuse restless medical students and demonstrators. This opinion, however, is merely the result of ignorance; for a very slight knowledge of modern physiology will show what an important part this instrument has taken in elucidating the mechanism of the circulation, in correcting mistaken ideas, and in verifying and making accurate what was before loose conjecture. It has been wisely said that "the physiology of to-day is the pathology of to-morrow," and this is especially true in the domain of heart disease, where any additional knowledge of the action of the valves or of the auricular and ventricular contraction is certain before long to be turned to account therapeutically. Physiology is the parent of the pathology and treatment of heart disease, and any apparatus that can correctly interpret and make manifest the changing phases of the circulatory system must, *ipso facto*, be of use in medicine.

The tracings copied in this paper were chiefly taken at the Bristol Royal Infirmary. They were obtained, as much as possible, under similar conditions and with the same instrument. In many cases the results were unsatisfactory, and it must be owned that the cardiograph, unaided by the stethoscope, would be a dangerous guide; but without unduly pushing its claims I think we may safely say (1) that it verifies diagnosis gained by other means, in a striking manner, (2) that it often assists the diagnosis in doubtful cases, and (3) that it may be used as an index of treatment by showing the amount of regurgitation into the auricles and ventricles in mitral and aortic incompetence, the extent of hypertrophy of the walls of the heart, and the state of the general arterial system, as to tension, &c.

Space will not allow of a detailed description of the cardiograph, but it may be said that it consists essentially of two air-tight metal boxes, or drums, connected together by a flexible tube. Each drum has one of its sides made of stretched india-rubber, and, since the whole forms a continuous cavity containing air, if one of the drums be pressed by its elastic side against the apex-beat on the chest wall, the slightest movement of the heart will compress the air in the apparatus and cause a bulging of the india-rubber membrane on the second drum, and these movements are, in their turn, amplified by a light lever, and recorded on blackened paper which is made to travel at a uniform rate. The greatest precaution must be taken to apply the instrument exactly over the heart beat, otherwise a very different tracing or "cardiogram" will be obtained, for the chest walls are actually drawn in in parts of the area over the contracting venticle, at least in thin subjects. The chief drawbacks to the cardiograph are

these: no two instruments give exactly the same results; that is to say, there is generally some difference in the height of the "up-stroke," the rapidity of the "down-stroke," &c., due to variations in the elasticity of the drum membranes, the length of the lever, the rate of motion of the recording cylinder, &c. Again, the instrument is somewhat bulky, requires practice and time, and is, moreover, sometimes alarming to the patient. A little trouble will overcome these difficulties. The subject may be thus divided:—(1) Analysis of normal tracings, (2) those taken from cases of mitral disease, (3) ditto from aortic, and (4) arterial tracings.

ANALYSIS OF THE NORMAL HEART TRACING.

Tracings taken from apparently healthy people differ from each other considerably, according to the tranquillity of the circulation, the shape of the chest wall, the amount of fat under the skin, the time of the day and the state of the subject as regards rest, &c. In most cases, for instance, the tracing is very different after the drum has been kept for a minute or two against the chest wall. During the first 30 seconds or so, either from nervousness or involuntarily holding the breath, the mark made by the lever may show almost every variety of diminished tension and irregularity. Figs. 1, 2 and 3 were taken from a healthy student at the Medical School. The instrument was placed over the upex beat and kept there steadily during the whole time, and yet the three are as diverse as possible. No. 1 shows a pointed, irregular, jerky impulse. This is the result of the first few seconds of application. In No. 2, after the lapse of about 30 seconds, the curve is quieter, but still irregular; and No. 3 is a fairly normal tracing. The typical "normal" tracing should be taken

from a subject accustomed to the machine. He should sit quietly, and should have been at rest for at least ten minutes previously. Muscular effort gives a double top to the tracing. Fig. 4 may be taken as a model for analysis. Each beat is represented by (1) the up-stroke, (2) the summit, and (3) the down-stroke. These are the three cardinal divisions of each tracing. The first (*a* to *b*) corresponds to the sudden "hardening" of the distended ventricle which is felt at the chest wall as the "beat." It may be looked upon as the commencement of the systole, but in reality it precedes the ventricular contraction. The ventricular wall, soft and flabby during diastole, suddenly becomes hard and tense and immediately afterwards contracts on the blood. The elevation (*au*), not always present, and very small in health, is due to the auricular contraction making itself felt in the ventricle. The second part, or summit (*b* to *c*), should be flat, not pointed, and might be conveniently described as the "plateau." It is rarely quite straight, and in disease may assume every kind of irregularity. This is the most important part of the tracing, and its history is worth careful study. The whole plateau corresponds to the ventricular contraction. During this period a struggle is going on between the ventricle on the one hand and the elastic force of the aorta on the other. The former is laboriously overcoming the resistance offered to it by the distended aorta. When the ventricle has nearly emptied itself it ceases from its effort, relaxes, and the lever falls. It will be seen in Fig. 4 that the first part of this tableland is slightly higher than the rest, partly because the contraction is at first more powerful, partly because the lever has been jerked up higher than it should have been by the impulse causing the up-stroke. Then there generally follow one or more

irregularities due to the oscillations of the blood in the ventricle and arterial system, for it must be remembered that these now form one cavity, because the semilunar valves are widely open. The ventricle keeps up its contraction with very little diminution of force until the end of the plateau, when it withdraws from the struggle and the aorta is left the victor. The elastic force of the latter, which is very great, at once comes into play and the blood rushes back into the ventricle, but is almost immediately stopped by the semilunar valves. This obstacle sometimes gives a slight jerk to the heart, as seen in the 4th beat in Fig. 4. This is called the "aortic notch" or beat. The down-stroke (*c* to *d*, Fig. 4) represents the cessation of contraction and the relaxation of the heart. It may be rapid or gradual, straight or uneven, and each of these conditions has a special meaning. It is especially modified by the state of the valves.

EFFECTS OF MITRAL DISEASE ON THE HEART TRACING.

I. *Regurgitation.*—When collecting tracings for purposes of analysis and comparison one soon realises how difficult it is to find a case of pure obstruction or regurgitation at any of the valvular orifices. The reasons for this are manifest; every influence which so modifies the valves as to impede the outward flow of blood is pretty sure to make them also incompetent; and conversely, the most common kinds of incompetence are associated with thickening of the valvular edges and therefore cause a certain amount of obstruction. For these reasons it may generally be assumed that whether a case be called obstruction or regurgitation it is not purely so. Figs. 5, 6, and 7 are examples of regurgitation with only a slight amount of obstruction, and the first two (Fig. 5 and 6)

are the most common type. The usual condition of things in this disease is as follows:—In the first place the left auricle and ventricle communicate more or less freely, and act, both in systole and diastole, as one cavity. In the second place, as the auricle has constantly to struggle with regurgitant blood, as well as with that which reaches it from the pulmonary veins, it becomes hypertrophied, and consequently its beat is more distinct than in health, and is made manifest in the apex tracing, as seen in (*au*) Fig. 5 and 6, and to a less degree in Fig. 7. I think this enlargement of the auricular notch is a fairly good index of the amount of backward flow into the auricle.

When the ventricle contracts, instead of having only one outlet for its volume of blood, it has two, the aorta and the auricle. In early stages of the affection this gives the ventricle less work to do, as, for example, when the mitral valves give way in aortic disease. But afterwards, when the lungs and the right side of the heart have become chronically distended, it has more to contend with than before, because it gets more blood sent into it. The result of having the auricle as an extra channel into which the blood can be driven is this: the struggle between the ventricular and aortic pressures is shortened; the ventricle with a short systole forces out its blood, partly into the auricle and pulmonary veins, partly into the aorta, and then, having emptied itself and fulfilled its duty, it retires from the contest; the aortic valves flap to with a jerk and the ventricle relaxes. Hence the second noticeable fact in the tracings, the absence of the plateau.

In consequence of the easier victory of the aortic tension the semilunar valves close with greater force and

the second sound is consequently often sharper; at least in moderate regurgitation. This aortic jerk is shewn in the tracings (Fig. 5 and 7).

In some cases the apex is double, as seen in Fig. 8, which is in many ways peculiar. The tracings taken from the radial, carotid and subclavian arteries of this patient shewed a markedly square top, and the heart disease was probably secondary to general arterial thickening. The cardiogram indicates hypertrophy by the height of the upstroke; mitral regurgitation by the auricular notch (*a*) and the pointed apex (*b*), and feeble tension by the second elevation (*c*), for it is quite possible to have great obstruction and feeble tension. Fig. 9 is the tracing of the left subclavian of this patient, and is interesting when compared with Fig. 8.

Mitral regurgitation, therefore, seems to affect the heart tracing chiefly in three ways, (1) by giving an upstroke broken by the mark of the auricular contraction, (2) by absence or irregularity of the plateau, and (3) by the presence in many cases of a marked aortic notch.

When there is both marked obstruction and regurgitation the tracing is very different from the above, and resembles the normal type in many points. Fig. 10 is taken from a case of double mitral murmur, and might represent a healthy tracing were it not for the auricular notch and the signs of hypertrophy. The rhythm in the above is too regular for simple mitral regurgitation.

II. *Mitral Obstruction.*—As before stated, it is difficult to conceive such a condition as would lead to mitral obstruction with no concomitant regurgitation. Consequently we cannot expect to find a special tracing characteristic of the first alone. Even in those cases in which there is a bruit presystolic in rhythm, and no

systolic one following, the cardiograph shows that regurgitation exists. In fact it seems doubtful if the so-called presystolic bruit has any existence. Herard and Constantin Paul argue that this bruit is not caused by the forcible contraction of a hypertrophied auricle, but by the early part of the ventricular contraction, preceding the time of greatest hardening of the ventricle, which would be felt as the apex beat. If this be true, the presystolic bruit would indicate regurgitation into the auricle. Fig. 11 is taken from a somewhat pronounced case of apparent presystolic murmur, followed by a systolic. The great irregularity of the plateau and ascent are to be noticed. There was a thrill in this case, felt over the auricular as well as ventricular region. The violent auricular effort imparts to the heart a general vibration. In this Fig. the two chief elevations are due to the low tension in the ventricle, and mean regurgitation. I think it can be laid down as a rule that if a murmur is heard most distinctly at the apex, and if the tracing obtained resemble Fig. 11, the diagnosis is rather that of regurgitation than obstruction, whether the murmur appear to precede the systole or not.

In consequence of the narrowed or obstructed auriculo-ventricular orifice the regurgitation is sometimes interfered with as well as the flow in the normal direction. There is consequently a plateau or rounded top occasionally present, as in Fig. 13. In Fig. 12 there is a small irregular top also in some of the beats, but the majority are pointed. According to Prof. Marey* the tracing ought to show a small upstroke and an absence of the auricular contraction notch. But, he adds, "Toutes ces suppositions sont à vérifier."†

* *Circulation du sang.*, chap. xlii. † *Ibid*, p. 693, op. cit.

EFFECTS OF AORTIC VALVULAR DISEASE ON THE HEART TRACING.

1. *Regurgitation.*—These tracings are very various, partly because the amount of regurgitation modifies the cardiac cycle according to its amount, and partly because of the great frequency of secondary mitral derangement; what may be called the "safety-valve action" of the mitral.

In moderate cases two points may be noticed: the first is obvious, and is merely the result of hypertrophy, namely, increased height of the upstroke. The second is a double apex. This is well seen in Fig. 14. Its mechanism may be thus explained. When the ventricle has finished its contraction, which is marked by the "first apex" in the tracing, it begins to relax, and the lever begins to fall. Normally this descent is straight, or only interrupted by a slight aortic notch, because the closure of the semi-lunar valves prevents any filling of the ventricle; but when these valves allow the blood to flow back the ventricle is again partly distended and the lever again rises. It is the shock of the regurgitant blood against the ventricular walls that causes the second apex (*b* in Fig. 14). This is taken from a severe case, and the second beat is well marked. I think the size of this aortic elevation is a fairly good criterion of the amount of regurgitation, a thing that is not always easy to detect otherwise, and the prognosis and treatment of the case would both be modified by this knowledge. Fig. 15 is taken from the same patient as Fig. 14, but after the exertion of sitting up in bed and having the back examined. It is interesting to compare this with Fig. 1, and to notice the similarity. The latter was taken from a heart that was merely "nervous."

Another feature of these tracings, but only an occasional one, is great irregularity of the summit and downstroke. Finally mild cases of aortic regurgitation may give a square top, and almost normal upstroke and downstroke.

2. *Aortic obstruction.*—Tracings show generally a long sloping upstroke occasioned by the laborious contraction of the handicapped ventricle, broken by occasional oscillation of the arterial pressure against which it is contending (Fig. 16).

The plateau may be rounded, short or long. When no regurgitation exists it is probably straight, and fairly long. Fig. 17 is introduced as a somewhat common form of tracing, taken from a case of aortic constriction modified by mitral regurgitation. On the whole the cardiograph is unsatisfactory in this disease.

Arterial tracings in heart disease.—The following figures were taken from different arteries, chiefly the carotid, with the cardiograph. They show distinctly the nature of the cardiac lesion.

Fig. 18 from a case of double aortic and regurgitant mitral disease shews hypertrophy (as evinced by size of upstroke), and a peculiar plateau, the second part of which (marked *b*) is apparently the result of the great aortic regurgitation that existed.

Fig. 19 is from a case of mitral regurgitation. The points worthy of notice are:—(1) The irregularity of rhythm; (2) The marked auricular systole (*au*); and (3) The oscillation of the plateau. Some small "abortive" pulsations are seen.

Fig. 20 is taken from the subclavian artery of a man suffering from aortic obstruction and slight regurgitation. There was also a systolic bruit at the apex, which

Plate I.

Fig. 1

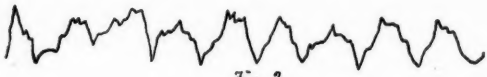


Fig. 2.

Fig. 3.

Fig. 4.

Fig 5.

Fig. 6.

Fig. 7.

Fig. 8.

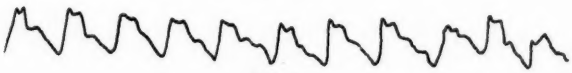


Fig. 9.

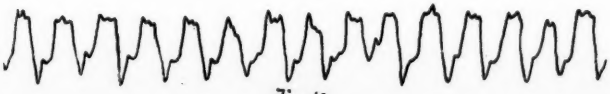


Fig. 10.

Plate II.

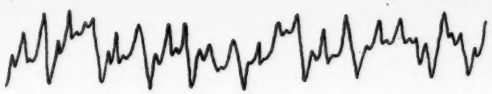


Fig. 11.

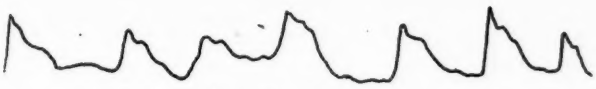


Fig. 12.

Fig. 13.

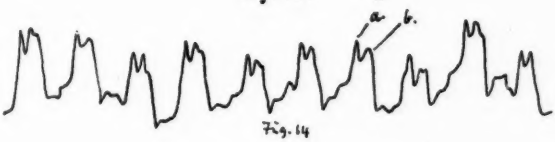


Fig. 14

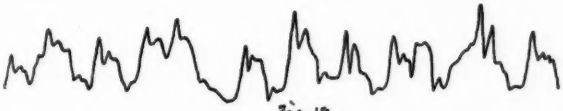


Fig. 15.

Fig. 16.

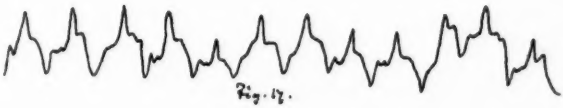


Fig. 17.

Fig. 18.

Fig. 19.

Fig. 20.

accounts for the small notch in the upstroke. The gradual ascent, the rounded top, and the sloping downstroke are worthy of notice.

I have introduced these three last figures because they appeared to me to be unusual. The sphygmograph has already indicated most of the characteristics of abnormal arterial tracings.

Finally, my only apology for bringing together and endeavouring to explain the above cardiograms is that so very little has been done, especially in England, in what might become a fruitful field of clinical work.

SURGICAL OUT-PATIENT NOTES.

BY

W. H. HARSANT, F.R.C.S.,

Assistant Surgeon to the Bristol Royal Infirmary.

DURING the last four years and a half I have from time to time written down a few brief notes of cases in the out-patient department of the Bristol Royal Infirmary, and on looking them over I have selected the following as likely to be of some interest to the practical surgeon. They are simply a few cases noted here and there as the exigencies of out-patient practice would allow, and are by no means a complete record of the cases of each kind mentioned. One of the disadvantages in the treatment of hospital out-patients is their irregular and intermittent attendance: thus a case which requires regular treatment for twelve months or more, such as a case of congenital talipes or of constitutional syphilis, will attend for three or four weeks and will then be lost sight of, the consequence being that very little good has been done, and the surgeon has lost sight of a case in which he is interested. Some exceptions are fortunately met with, and among them several will be found recorded below where patients have regularly attended for a period of two years or more, thus enabling the effects of treatment to be steadily observed. Another disadvantage, common, however, to all hospital practice, is the difficulty of ascertaining a reliable family history; this can only be obtained by the patient's own account, and is frequently of the most unsatisfactory and unreliable character. In some of the

cases of congenital syphilis mentioned below I have succeeded in getting a tolerably complete history, as far as it can be thus obtained, but in others nothing definite could be found out.

FAMILIES WITH CONGENITAL SYPHILIS.

Although cases of congenital syphilis are so frequently met with in the out-patient room, and are for the most part so easily recognised, yet it is always interesting to inquire into their family history, and to ascertain how far the disease has involved other members of the same family. The following are some of the examples that have lately come under my care:—

Case 1 consisted of a family of children, several of whom have been brought to me at different times, and are still under my occasional observation. I first saw them in April, 1879. The mother was a healthy-looking woman, but had an ulcer on the calf of her leg which was probably syphilitic. She said her husband suffered from abscesses and swellings on his bones. She had had ten children, of whom only five were living, the others had died in early infancy, and it was interesting to note how the disease seemed to wear itself out with successive births. Thus her first child died at two months and her second at one month old. The third lived and was affected the most severely. The fourth and fifth children died young, as did also the seventh. The sixth was living and was under my care. The eighth was also brought to me, while the ninth and tenth were living and quite healthy. The three children who were affected have all been under my care, and all have well marked congenital syphilis. The eldest, aged 14, is stone deaf, and has been so for three years; he has keratitis in both eyes,

and marks of old sores over the nasal bones; he has a fœtid discharge from the nose, his teeth are healthy, but there are fissures around the mouth. The next child, aged 10, has very depressed nasal bones, and a fœtid discharge from the nose; she has obstruction of both nasal ducts, for which I have slit the canaliculi and passed probes. Her teeth are healthy. The other child, aged eight, has keratitis, a flat nose bridge, and scars about the lips. They have all been treated with cod liver oil and tonics, and have been much benefited.

Case 2.—A baby, aged seven weeks, was brought to me on July 2nd, 1880. The mother had six miscarriages, then a living child, then another miscarriage, then this child. The other living child was said to have had a rash when three months old. This child was well until it was two weeks old when it had snuffles and a rash on the nates and genitals. When I saw it it was covered with an erythematous rash, especially on the genitals; the feet and hands were peeling; it had snuffles and constant diarrhœa, the motions being green. It was treated with mercurial ointment applied to the abdomen, and when I lost sight of it there was considerable improvement.

Case 3.—A girl, aged 10, came to me on February 3rd, 1879. The family history here was negative. She was the youngest but one of four children, the others being said to be healthy. The mother could give no history of syphilis in herself nor in her husband. She had had one miscarriage at six months, between the first and second children. When the patient was twelve months old she had a rose rash on the buttocks and genitals, two months before I saw her both eyes became affected. When she came to me she had a very old look, the upper central incisors were typically pegged and

notched, the lower teeth were much broken, and there were several scars about the chin and angles of the mouth. Both eyes were affected with advanced keratitis, so that she could only just discern light. She was treated with syrup of the phosphate of iron, but only remained under treatment for three weeks, when I lost sight of her.

Case 4.—A baby, aged four months, was brought by his mother on Feb. 10th, 1879. He was the youngest of three children. The eldest had a rash on the buttocks when three months old, and also had snuffles; it has been delicate ever since. The second child also had a rash at about the same period, and has since been delicate. This child (the third) was the worst of the three. He was only two weeks old when he first had a rash on the buttocks, and snuffles; now when four months old he has a tubercular eruption on the buttocks, face and head. The nose is much depressed. There is constant diarrhœa, with green motions, and a general look of cachexia. I could get no history of syphilis in the father or mother. He was treated with mercurial ointment applied to the abdomen, and cod liver oil internally, and had improved much when I last saw him.

Case 5.—I. M., aged three months, was brought to me on Sept. 23rd, 1879. It is an eighth child, all the others being healthy except the seventh, which had a rash on the buttocks when three months old, but is now well. This child had a rash when a month old, which first appeared on the nates, but afterwards spread to the scalp, arms, &c. It is a puny, wasted baby, covered with a mixed rash, vesicular, pustular and roseolar. It was treated with mercurial ointment, applied to the abdomen on flannel, and rapidly improved. When I last saw it the rash had nearly disappeared.

Case 6.—M. A. S., aged four months, was brought to me on March 28th, 1879. The mother had been married 15 years, and had six children, of whom five were living; all were said to be healthy except the youngest. Her husband had contracted syphilis and had infected her two years before the birth of the last child. After this she had given birth to a still-born child, and then to the one which she brought to me. The baby had an erythematous rash on the buttocks, and well marked snuffles; it presented a very wasted appearance. The mother had a gumma on the forehead. The baby was treated with mercurial inunction, and the mother with iodide of potassium, and both were under treatment for a considerable time with much benefit.

Case 7.—In this case mother and baby are both under my care, and the syphilitic history is clear. The mother is a healthy-looking country woman, aged 33. Three or four months after marriage, when pregnant with her first baby, she had a severe attack of syphilis, with sores on the genitals, rash and sore throat. Her husband had syphilis before marriage, but thought he had quite recovered. The first child was still-born. The second died at two months, of wasting and diarrhœa. The next miscarried at six months. The fourth is now living, aged five years, and has been cut for stone in the Infirmary, but is otherwise healthy. The fifth child died at eight months, of wasting. The sixth is the baby under my care, aged three months. It was six weeks old when a rash appeared on the buttocks and genitals. It has snuffles, and presents a prematurely old look; there is an erythematous rash on various parts of the body, and occasional diarrhœa. It is being treated with gray powder internally, and mercurial inunction to the ab-

domen. The mother is taking iodide of potassium, and both are improving.

Remarks. It is a well-known fact that the syphilitic dyscrasia has a tendency to wear out and exhaust itself upon the first children. This *law of decrease*, as it has been termed, is well exemplified in cases 1, 2 and 7. It has even been said that the regular diminution of the influence of the poison expresses itself in successive children by the longer or shorter duration of intra-uterine life. Thus Diday mentions a case where the first child was born at 6 months, the second at 7, the third at $7\frac{1}{2}$, the fourth at full time, but surviving only 18 hours, the fifth also at full time, and surviving six weeks, and the sixth, lastly, living four months before any treatment was adopted. Here it is almost an arithmetical progression. And even in those cases which at first sight appear exceptions to this law of decrease, an explanation may be sometimes found in the fact exemplified in case 6, where the parents contracted the disease subsequently to the birth of the healthy children, but previous to that of the diseased ones.

The first sign of congenital syphilis in infants is nearly always a rash on the nates and genitals. Is there any peculiar characteristic in this rash by which alone we can recognize it as syphilitic? Probably not, but in the large majority of cases a rose rash on the nates and genitals of a young baby is indicative of congenital syphilis. Intertrigo must of course be distinguished from it, also the simple rose rash which appears on the nates at the same time as on the rest of the trunk, but a rash met with on the genitals and nates exclusively in a child of six weeks or two months old is in my experience generally syphilitic, even where no mucous tubercles are to be found.

LUPUS VULGARIS.

Case 1.—E. S., a healthy-looking girl of 15, came to me on Oct. 31st, 1882, with a patch of lupus on the right cheek. It was single, and measured 4 inches by 1 inch. It had existed for 5 years, and at different times various caustics had been applied. When I saw it the skin was ulcerated over the whole of it with irregular nodules representing the original tubercles scattered here and there. There was very little strumous history to be obtained; her father and mother were fairly healthy, and one sister has since been attending me for a sinus under the lower jaw, leading to necrosed bone. I scraped the lupus thoroughly with a Volkmann's spoon, under chloroform, and dressed the wound with boracic lint. By November 26th it had completely healed, leaving nothing but a healthy looking cicatrix. I ordered her cod liver oil and arsenic, which she took for some time. On December 23rd the upper part of the scar presented three or four freshly developed tubercles; they had not ulcerated, but presented a whitish summit, and were evidently spreading, so I scraped the upper part again as before, and by January 14th, 1883, it was quite healed. On March 7th she came to me again with several tubercles at the lower part of the scar; the upper part was then looking quite firm and healthy. I scraped the lower part thoroughly, and on April 3rd, when I next saw her, it was all quite well. On April 27th she came to me again, with three fresh tubercles scattered irregularly over the scar, so on May 3rd I scraped these, and when I last saw her the cicatrix was all quite firm and well.

Case 2.—B. W., aged 24, came to me first on April 28th, 1882. On the centre of her left cheek were two

patches of lupus, the upper one measuring 3 inches by ½ inch, and the lower one being about the size of a six-penny piece. Both places consisted of an aggregation of tubercles without any ulceration of the skin. She informed me that she had twelve months before been under the care of Mr. Malcolm Morris, at St. Mary's Hospital, and that he had scraped the upper patch for her, and that she had applied some caustic application once a fortnight afterwards for several months. She had thought for a time that it was cured, but it was now rapidly growing again. I placed her under chloroform and scraped both places thoroughly, taking great care to destroy all the soft parts. It had quite healed in a fortnight, and I hoped it was cured, but she came to me again on February 28th, 1883, with the upper patch showing several fresh tubercles. I scraped it again, and it soon healed, and I have not seen her since.

Case 3.—M. M., aged 20, a dressmaker, was formerly in the Infirmary with severe ulcerating lupus affecting the nose and left cheek. She was admitted on April 7th, 1882, and presented a very hideous appearance, having lost nearly all the nasal cartilages from ulceration, and having also an ulcerating patch on the cheek. She was treated for three months with strong chromic acid applied to the parts every three or four days, together with various constitutional remedies, but without any benefit whatever. She came under my care on July 30th, 1882, and I at once scraped away the whole of the soft growth from the nose and cheek, causing thereby no doubt some further loss of substance, but much less than might be expected. She made a rapid recovery, and on August 20th, when I last saw her, it had quite healed, and she expressed herself as feeling better than she had done for years. Although I have not seen this patient since, yet I recently heard that she had some

slight return of the affection in the nose; should she come under my care again I should unhesitatingly scrape it afresh.

Remarks.—There are three methods of treating lupus. 1st. By caustics or the actual cautery. 2nd. By linear scarification. 3rd. By erasion. I have had some experience of the first method, and I consider it most unsatisfactory, it is extremely tedious, painful, and altogether uncertain. The actual cautery is probably the best form, but the sore left by it is a longer time in healing and makes a worse scar than the erasion method, but the great drawback is that it destroys some of the healthy surrounding tissues as well as the growth.

The second method, by linear scarification, I have never tried; it is strongly recommended by Mr. Balmanno Squire, the advantage claimed being that no tissue whatever is taken away, but the whole remains to form the new cicatricial tissue. If it could be depended on to destroy the growth, it would, no doubt, be better than the erasion method, but I cannot think it would be so effectual as the removal of the growth.

The third, or erasion method, was introduced some years ago by Dr. Volkmann, of Halle, and has since been very widely practised, and has met with a chorus of praise.

Mr. Jonathan Hutchinson, in his paper on lupus, read before the Association at Cork in 1879, said, "The erasion treatment appears to give less pain, to be very efficient, and to leave a sore which heals rapidly and soundly. Its introduction will mark a new era in the treatment of lupus. It is so simple, so easy of employment, and has in it so little that is alarming either to surgeon or to patient, that it is likely in the future to be employed in the early stages whilst there is good hope of the complete cure of the disease."

It consists simply in scraping away all the succulent cell growth with a Volkmann's spoon. This little instrument will not destroy healthy skin, but when drawn over a patch of lupus it will remove all the diseased parts, leaving only the healthy surrounding tissue. The wound made by it heals very quickly, and the resulting scar is very soft and flexible. It is the most satisfactory mode of treatment we at present possess. I have practised it in about ten cases, and recurrence has taken place in only four or five. In most of the others, I presume, the cure has been permanent or I should have heard of them again.

STRUMOUS SYNOVITIS OF THE ELBOW CURED BY REST AND SIMPLE TREATMENT.

Case 1.—E. J., aged 15, a boot machinist, living at Kingswood Hill, first came to me on April 13th, 1881, and has been regularly under my care ever since. Her family history is good, parents being very healthy. She was always delicate and thin and has had occasional coughs. Her chest is very flat, but there are no physical signs of phthisis. She had suffered from synovitis of the right elbow for three months before I saw her. It commenced without injury, and was at first very painful and swollen. On examination I found the synovial membrane of the right elbow presenting the usual boggy semi-fluctuating feeling met with in pulpy disease. The movements of the elbow were almost absent, and any attempts at movement were accompanied with acute pain. The limb was at first fixed on an angular splint, and Belladonna ointment applied to the joint. Cod liver oil was given, together with iron tonics. The splint was kept on for three months, and then Scott's dressing applied. She came to see me every fortnight and I used gentle passive

movements, directing her to keep it quiet in the intervals. She wore the Scott's dressing for six months, and since then various simple remedies have been used at different times, such as the pressure of a bandage, frequent shampooing, iodine paint, &c., whilst she herself has made constant passive movements. The result has been very gratifying, for the joint is now nearly well. She can extend the elbow almost to a straight line, while she can flex it sufficiently to "do her back hair," which is the most satisfactory test of the usefulness of a woman's elbow. The power of supination is imperfect, and this movement still gives her some pain, but the swelling has nearly all disappeared, and the usefulness of the limb is increasing every day. The muscles of the arm and forearm are somewhat smaller than on the other side, but are daily improving with shampooing.

Case 2.—E. C., aged 27, is a thin, weakly-looking young woman, a dressmaker, living in the city. She came to me on May 2nd, 1882, and is still under treatment. Synovitis of the left elbow commenced three months before I saw her, without any injury, and had continued ever since. There was scarcely any movement in the joint when I first saw her, but acute pain on attempts at movement. It was first fixed on an angular splint, and Belladonna ointment applied to the joint. On October 24th the splint was discontinued and Scott's dressing applied; even now there was scarcely any movement. This dressing was continued until December 19th, when it was replaced by an ordinary cotton bandage, which was taken off daily to admit of shampooing and passive movements. She has taken cod liver oil nearly the whole time, and has once or twice been to the country for a change of air. The improvement in the joint has

been steady and marked. She can now (May, 1883) flex the joint so as easily to reach the mouth, but cannot yet do her back hair; she can extend it almost to a straight line; supination is very imperfect, but pronation is perfect. There is now no pain and very little swelling in the joint.

Remarks.—These cases seem to me very encouraging, as they show that pulpy disease of the elbow, in some cases at all events, has a tendency to recover if placed under favourable circumstances. Are we ever justified in excising the elbow joint for pulpy disease? I should be inclined to answer that we are, if time is of great importance to the patient but not otherwise. A case of synovial disease, which has existed in the elbow for three or four months, so as to prevent the movements of the joint, will almost certainly require two years rest for its recovery, and it may be considerably longer before the limb is fit for any hard work; but it is something to feel that one may hold out favourable hopes of recovery in these cases even after the lapse of so long a time. I shall be very reluctant in the future to advise excision of the elbow for pulpy disease unless the bones also are involved in the joint mischief.

SUPPURATION IN THE ANTRUM CURED BY FREE DRAINAGE.

Case 1.—G. G., aged 16, came to me on January 16th, 1883. He was a healthy-looking boy, living at Melksham, where he had been under surgical treatment for some time. He had noticed a swelling of the right cheek for three years, which slowly increased in size. When I saw him he had a firm elastic swelling causing a prominence of the cheek, pressing downwards on the hard palate and projecting most prominently within the mouth just above the lateral incisor tooth. There was a small sinus here

which occasionally discharged pus. The teeth were all apparently sound and none were absent, nor had he suffered from toothache. I could not ascertain any cause for the mischief. On March 8th, chloroform having been administered, I made a free opening into the swelling with a scalpel just above the alveolus within the mouth. The anterior wall of the antrum was so thin that the scalpel entered it readily, and I was able to make an opening sufficiently large to admit my little finger. I scraped the interior of the cavity with a Volkmann's spoon, and turned out a quantity of inspissated pus and granular *débris*. I then syringed the cavity with boracic lotion, and gave him instructions to syringe it himself daily. The swelling rapidly diminished in size, the opening gradually closed, and when I saw him on April 5th he was quite well.

Case 2.—W. B., a labourer, aged 35, came to me on May 14th, 1883, with a similar swelling of the right antrum which had existed three years. The upper lateral incisor tooth of the right side was broken off across the middle of the crown from an accident twelve years ago. He said he had frequently suffered much pain in this tooth. The swelling projected into the right nasal fossa as well as on to the cheek and hard palate, and there was a constant purulent discharge from the nose. Chloroform having been administered, I first extracted the damaged tooth, and then pushed up a trocar and canula through the hole thus made in the alveolus into the abscess cavity. I then inserted a drainage tube into the opening, and cutting the end off level with the adjacent teeth, allowed it to remain in. He came to see me daily, and I syringed out the cavity with boracic lotion through the drainage tube. The purulent discharge from the nose at once ceased and the swelling diminished. The presence of the drainage tube caused him no incon-

venience, but I thought it best to remove it after three days. The sinus soon closed after this, and he is now quite well.

Remarks.—Abscess of the antrum is generally caused by disease of the root of one of the upper teeth extending through the thin plate of bone separating them from the cavity. The tooth involved is generally the first or second molar, but in the case recorded above it was the lateral incisor which caused the mischief. The crown of the tooth was fractured by an accident, opening the pulp cavity; disease extended to the fang, causing much pain; suppuration ensued, and the mischief extended to the antrum.

Abscesses in the antrum, if left alone, discharge themselves generally either through the nose or through the anterior wall of the alveolus; cases have even been recorded where they have discharged through the orbit; but in any case they seldom cure themselves in this way. It is nearly always necessary to make a free dependent opening, so as to allow them to drain freely. If a tooth be deficient, the opening may be made with advantage through the empty socket, but if the teeth are sound and perfect it is quite sufficient to make the opening above the teeth, as in my first case recorded above. Abscesses in the antrum are for the most part easy to diagnose, but it is not always easy to distinguish them from solid growths of the jaw. Thus a little girl, aged two years, was brought to me on January 20th, 1883, with a soft elastic swelling of the cheek, pressing downwards on to the palate and upwards to the eyeball, as well as forwards on to the cheek. It felt so soft and fluctuating that I was induced to puncture it, thinking it might be a cyst or an abscess. It turned out to be a cancerous growth, and the child was admitted into the house, and afterwards had the upper jaw excised by my colleague, Mr. Prichard.

MISPLACED TESTICLES.

Case 1.—J. T., aged 12, came to me January 8th, 1883. Both his testicles were undescended and lying in the inguinal canals close to the external abdominal rings. Both were painful and very tender, and had been so for some months. He was unable to walk or even to stand without pain, but was most easy in the sitting posture. Sometimes he could not sleep at night owing to the pain in the testicles, but sometimes they were quite easy. There was no hernia on either side. The scrotum was very small and atrophied. I prescribed a preparation of Belladonna for local application, and advised rest; but I never saw him again.

Case 2.—This was a curious case of displaced testis, the result of an injury. S. G., aged 43, came to me on February 7th, 1883. He had fallen off a ladder the day before, and had alighted on to his perineum astride of some iron railings. One of the spikes had penetrated the posterior part of his scrotum, causing a large effusion of blood into the scrotum and perineum. When I examined him there was a large blood swelling in the perineum, and the left testis had escaped from the scrotum and was lying farther back embedded in the blood clot. The effused blood slowly disappeared, but the testis remained in the perineum. I last saw him on March 20th. All swelling had subsided and the punctured wound had healed. The left testis was still in the perineum, and could be moved backwards and forwards with the fingers. He suffered no inconvenience from it unless he sat astride anything, when he had to be careful to draw the testicle forwards before sitting down. But as he told me he was not likely to ride on horseback I advised him to leave it alone.

CHANCRE ON THE LIP.

J. E., a healthy-looking young woman, came to me on January 23rd, 1879, complaining of a swelling on her upper lip. Patient was single and was a paper bag maker by trade. Five weeks ago she first noticed a pimple on the lip, then a scab appeared on the surface, and it gradually became hard and increased in size until it reached its present dimensions. A week ago a rash appeared on the neck and thighs. I questioned her somewhat closely as to any infection, and the only explanation she could give was that she had been "keeping company" with a young man and had frequently kissed him, but she did not know that he had any cracks or sores on his lip. When I first saw her the chancre was an inch long a little to the right of the centre of the upper lip. There was a scab over part of it, and well marked induration around the base. There was a large mass of indurated glands in the right sub-maxillary region, and a papulo-squamous eruption on the back of the neck and thighs. She was at once placed on mercurial treatment, beginning with inunction of ointment until the gums were touched, and afterwards on the red iodide of mercury internally; but the attack was a very virulent one, and only gradually yielded to treatment. She continued as an out-patient until September 2nd, taking mercury in some form nearly the whole time. The lip had recovered long before, but the rash and enlarged glands had not quite disappeared when I last saw her.

CONGENITAL TALIPES.

About twenty cases of congenital talipes equino-varus have come under my care during the last few years, and I have treated all of them pretty much in the way recom-

mended by Ogston in his paper in the *Edinburgh Medical Journal* for December, 1878. I look upon congenital talipes as being due to a form of arrest of development of the fœtus, in which the affected feet have never become properly unfolded, a view which was first brought prominently forward in this country by Hardie, of Manchester, in the *British and Foreign Medico-Chirurgical Review* for April, 1871, and which has since been so widely accepted. I cannot at all understand Stromeyer's view, that it is caused by a spasmodic contraction of the muscles on the side to which the foot is directed, nor Barwell's theory, that it is due to paralysis of the muscles on the opposite side, although, doubtless, both these causes prevail in *acquired* talipes. But in congenital talipes the causes which give rise to the faulty position come into operation at a period long anterior to that at which the nervous or muscular system could be sufficiently developed to produce it, and the condition of the muscles is a consequence and not a cause of the affection. Holding these views, I make it my endeavour first to mould the affected feet into as good a position as possible with the hands, either with or without chloroform, according to the age of the patient, and then to fix them in the improved position with plaster of paris bandages. The first point is to restore the *varus*, which may be always done as easily without the division of tendons as with. Then afterwards the *equinus* is attacked, and this may be doubtless facilitated by division of the tendo achillis. I believe it to be important to attack the disease as early as possible, for then the bones and cartilages are so much more readily moulded into proper position. I am aware that Ogston recommends waiting until the child is six or nine months old before commencing proceedings, on the

ground of the tenderness of the skin in very young children, but in one of my cases I put the bandages on to both feet of a child a month old, and it has worn them constantly ever since without any bad effects, although it was the worst case I ever saw. It is always necessary to warn parents of the tedious nature of the treatment before commencing. Friends are frequently anxious that the offending feet should be "turned" by a cutting operation, believing that this is all the treatment that will be necessary, and in this opinion they are too often supported by their medical attendant. It cannot be too strongly insisted upon that the treatment of congenital talipes must be a gradual one. The distorted skin, muscles, ligaments, cartilages and bones, have to be gradually moulded to their proper shape and fixed there for a considerable time before they will retain their new position, and the treatment has to be kept up for some time after the child begins to walk or it will surely recur. The first time the plaster of paris bandage is applied I generally keep it on about six weeks, it is then removed and left off two days to allow the skin to recover, then another is put on and allowed to remain about two months, and then afterwards it is renewed every two months until the child is about two years old, when the foot will generally be found to have assumed its normal shape. The muscles will even then require constant shampooing for some time before they will reach their proper size and strength, as there is always considerable want of development of the muscles in these cases. A great deal of the success depends upon early treatment. I have never had much success when the child has reached the age of twelve months before the treatment has been commenced.

Clinical Records.

TWO CASES OF COMPRESSION OF THE SPINAL CORD BY SARCOMATOUS GROWTHS FROM THE SOFT MEMBRANES.

By E. Long Fox, M.D. Oxon., F.R.C.P., Consulting Physician to the Bristol Royal Infirmary.

The following case is recorded as an instance of a rare lesion, both as to pathology and position. The case was under the care of Dr. Colman, by whose permission it is reproduced here.

Mrs. G., 35. In the early part of 1882 she was lifting a heavy window, and felt it too much for her, and was sick. About one month after this she began to feel pain in the right arm, and some weakness of the right hand. These symptoms gradually increased for several months. In the summer of the same year she got wet through. Shortly after this, loss of motor power affected both arms and both legs.

When seen in consultation in November, her state was as follows:—

Almost complete motor paralysis of both arms. She can move each hand about a quarter of an inch if she moves both hands at once. Sensation in hands and arms much impaired but not absent. In the legs, motor paralysis was complete, and sensation dull, but better than in the arms.

Some weeks ago the urine passed involuntarily; now no incontinence of urine, but some difficulty in commencing micturition. Some difficulty also in expelling fæces; constipation throughout the illness. Pupils regular.

Knee jerk exaggerated in both legs. Well marked ancle-clonus on both sides. Tapping over the shin-bone causes ancle-clonus. Tapping over the lower part of biceps causes contraction of little and ring finger, and this on each side. Plantar reflexes rather exaggerated. No marked atrophy anywhere, except that the muscles of the arms and hands are small and flaccid from disuse, especially on the left side. No bed sore. She looks bright and rosy and well in the face. Can be placed in a chair in a semi-erect position. The extremities are often cold, or she is cold on one side of the body and hot on the other. No other vasomotor phenomenon. There is tenderness and perhaps a little swelling over the sixth cervical vertebra, over which she has had a seton for six weeks. She cannot turn her head quite well. No ocular disturbances. Brain clear. She sleeps and eats fairly. The diagnosis then made was that of a minute hæmorrhage or inflammatory exudation, beginning on the right spinal membranes about the sixth cervical vertebra. It was thought that the inflammatory action had spread round to the other side—that the original exudation had probably developed into a growth compressing the cord on the anterior surface, causing compression-myelitis; but that the anterior cornua has not yet suffered much; and that descending lateral sclerosis supervened as a secondary result. It was probable also that the original lesion had been caused by the strain at the window.

Her health remained tolerably good during the winter, except that for some months she suffered from severe carbuncles near the seat of lesion. She went out during the winter, but caught cold in the early part of April. When seen in consultation on April 13th, it was found that she had very slight bronchial catarrh, and that she

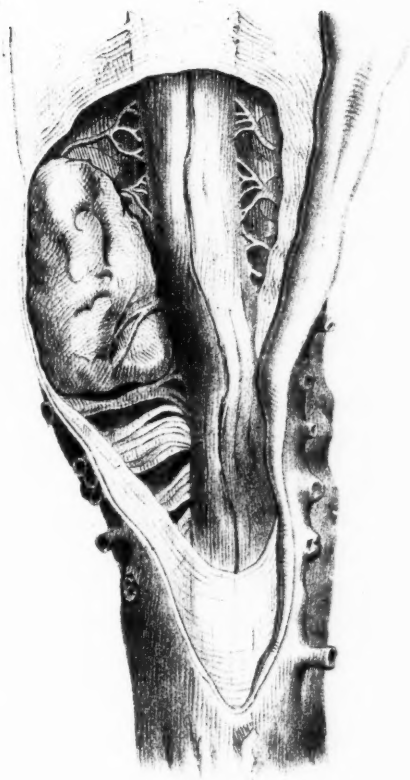
was quite unable to cough. There was no intercostal movement whatever, the respiration being wholly diaphragmatic. There was a central bed sore. She lived in this state for six days. The intellect was clear until within an hour of death.

Post Mortem Examination.—The spinal canal alone examined. On removing the cord and its membranes from the canal the cervical bulb was evidently abnormally large. The dura mater healthy on both surfaces. The arachnoid was thickened, so much so as to conceal the subjacent parts. A hard, rather vascular tumour, about an inch and a half long and three-quarters of an inch broad, lay on the anterior surface of the cord, destroying the cord by pressure at this spot, except apparently the posterior columns (Pl. III.). All the cord below the tumour down to the lumbar region was somewhat softened; at the level of the growth it was almost deliquescent. The shape and position of the growth and of the cord itself is seen in the accompanying plate. The arachnoid was firmly adherent to the tumour. At the upper end of the tumour, exactly at the lateral surface, the arachnoid was adherent to the dura mater, as though at this point the pressure of the growth had been exerted outwards, and a minute region of inflammation of both arachnoid layers had been the result. The tumour could be easily detached from the cord and turned back; a thin pia mater lay between it and the cord. The growth was a spindle-celled sarcoma (Pl. IV., Case 1), but more fibrous than Case 2 about to be mentioned.

The chief points in the case are—

1. The position of the lesion. The pressure being from the anterior towards the posterior portion of the cord explains the motor paralysis being so much more

Plate III.



Sarcomatous Growth compressing
the Spinal Cord.

intense and advanced than the sensory. The lesion not reaching as high as the fourth cervical nerve necessitates the freedom of the phrenics, and thus the normal action of the diaphragm.

2. Life was prolonged for six days after all thoracic respiration had ceased. This is unusually long compared with the cases of cervical compression from accident, where life seldom persists for more than four days with diaphragmatic breathing only.

3. The almost complete absence of vasomotor and oculo-pupillary phenomena is striking. Their absence in such extensive lesion of the cord in this region points to the possibility of independent action of the cervical sympathetic ganglia.

4. Was there any connection between the lesion found and the accident from which the phenomena dated? In a case recorded in the Bristol Infirmary Reports by Dr. Shingleton Smith and myself, the lesion, which seemed to date from a similar slight accident, did not lead to fatal results for five years. But in this case, as indeed is much more usual in cervical paraplegia, the lesion affected the dura mater. Was the more rapid course in Dr. Colman's case due to the arachnoid being the membrane affected? Or had the disease been going on for a considerable period in an early stage, and only developed these acute phenomena in consequence of the strain?

5. From the position of the tumours one would hardly have expected that the motor paralysis of all the muscles of the arm should have been so complete. There was no difference in this respect between the deltoid and the muscles of the upper arm and those of the hand. Judging from the experiments of Drs. Ferrier and Yeo, the muscles of the upper arm might have escaped for a longer period.

6. As to the nature of the tumour. Speaking generally, compression-myelitis from morbid growths will occur either from enchondroma, exostosis, or carcinoma growing from the bones themselves, and with a very slow course, even sometimes from hydatids, or more commonly from disease of the membranes, sarcoma and carcinoma, with their varieties, glioma, friboma and myxoma, the latter especially from the soft membranes. The majority of these have their starting-point on the inner side of the dura mater. Of these, carcinoma and myxoma are apt to extend largely, whilst sarcoma and melano-sarcoma have generally smaller boundaries. Lipoma, tubercle, and gumma may also own the membranes as their origin. Or, again, the cord itself may be the seat of carcinoma, sarcoma, glioma, and myxoma, and more rarely of syphilitic gumma and tubercle.

In the case recorded the visceral surface of the arachnoid was evidently the original starting-point of the growth. The tumour seemed vascular, even to the naked eye, so much so at one spot in the centre of its anterior surface as to suggest the idea of melano-sarcoma.

In connection with this case may be mentioned another that died in the Infirmary some years ago. Apart from the rarity of such cases it is interesting as affording an illustration of the union of lepto-meningitis with tumour of the soft membranes.

Case 2.—John D., 29. Has never been a robust man, has had cough and dyspnœa at night occasionally; his mother, grandmother, and sister died phthisical. No history of nerve disease, except that most of the family were affected with melancholia. No syphilis, always temperate, and a total abstainer for four years. Three months ago he was in good health. Shortly after

this he began to experience shooting pains in the arms, much worse when he was lying down, especially at night. No numbness, no spasm. The fingers of the right hand gradually became flexed, and the power of extending them gone. Shortly after this the fingers of the left hand became similarly affected. About five weeks previously he felt the toes of the right foot becoming numb, with a slight pricking sensation; this feeling of numbness gradually extended upwards. A day or two after the right foot began to be thus affected the left foot was seized in exactly a similar manner. The numbness has continued to progress upwards. When it reached the calves of the legs the patient began to have the girdle feeling round his chest, and also to find slight difficulty in passing his water, especially at night. He had to have a catheter passed occasionally. Frequent priapism. No pain in the back on percussing vertebræ. Special senses good, except that his sight was not good, and that sensation was dull in certain regions. No sensation in legs, thighs, abdomen, and chest as high as the third rib, on admission. No hyperæsthesia anywhere. Plantar reflexes normal. Deep reflexes not understood at that time. No voluntary power in the lower extremities. He can move his arms over his head, but cannot use the fingers at all from extreme flexion. He was unable to feed himself. Respirations 24 per minute, thoracic and diaphragmatic. He lived two months after admission, the loss of power and anæsthesia rather increasing in intensity, though not extending higher. His legs were continually jerking, and at times were completely drawn up, he being unconscious of the fact unless he was looking at them. The muscles of the upper extremity became at last completely paralysed, except that the trapezius and deltoid retained a small

amount of power. Thoracic breathing diminished toward the close of life.

Post Mortem Examination.—On opening the spinal cavity the dura mater seemed unusually full and tense. No morbid appearances otherwise. No adhesions within the cavity. The cord, or what at first sight appeared to be the cord, seemed to be generally larger and fuller than usual; and at its upper portion, midway between the cervical bulb and second cervical vertebra, was a swelling on its left posterior aspect. On section this was found to be a tumour, with well-defined margin of purplish colour, tolerably firm to touch, an inch and a half in length and three-quarters of an inch in diameter. Much softening of the cord round the tumour, and half an inch above and below it. On making a transverse section of the cord, it was found that the cord proper was smaller than normal, but the great increase of size that was visible on opening the dura mater was owing to a belt of yellowish-grey substance, fully a quarter of an inch in thickness, which enveloped the cord equally on all sides. It was not quite so abundant in the immediate region of the tumour, but elsewhere it existed, as above described, from the highest portion of the cord to the cauda equina. It could readily be separated from the cord. The pia mater and arachnoid could not be separated from it. The brain itself was healthy, except that at the base the pia mater covering the pons and around the medulla oblongata was very much thickened, and studded with what appeared to be rounded masses of exudation, extending along the vessels as far as the sylvian fissure. No brain tissue came away on stripping off the pia mater. Microscopically the spinal tumour was seen to be a spindle-celled sarcoma (Pl. IV., Case 2).

Plate IV

A CASE OF PURULENT SUB-ARACHNITIS, PROBABLY METASTATIC.

By GEORGE THOMPSON, M.D., L.R.C.P., Medical Superintendent of the Bristol Lunatic Asylum, Stapleton.

Jane W., æt. 56, single, a manager of a registry office at Clifton, was admitted to the Wilts County Asylum, at Devizes, on the 8th of September, 1880.

Without giving any warning she disappeared from her home at Clifton, and was picked up by the authorities of an Union in Wiltshire, and, as she could give no account of herself, sent to the County Asylum. While there she at first suffered from mania. She was unable to give an account of herself, or any reliable information as to her past life. She said she had been tempted by the devil to destroy herself, and believed she was going to be severely tortured. Fourteen days later she had settled down, and complained of pain in her head. Bromide of potassium was prescribed for her.*

She was admitted to the Bristol Asylum on the 3rd of June, 1881. She was in fair bodily health, but was evidently suicidally disposed.

From time to time she complained of pain in the head, referring it to the occiput. No especial note was made of her until April 2nd, 1883, when she complained of sickness and diarrhœa.

* The above is abridged from a copy of the notes in the case-book of the Wilts Asylum, kindly supplied to me by Mr. Bowes, the Medical Superintendent.

On the evening of the 2nd April her temperature was found to be 102.8, and on the following morning 103.4, pulse 120, respiration 30. Her right lung was dull at the back, and some coarse crepitation was heard, with increase of vocal fremitus.

She passed through an attack of "single" pneumonia and appeared to be recovering, when, on the 9th instant, the temperature suddenly rose. Albumen appeared in the urine in large quantities, though no casts were found under the microscope. She became gradually insensible, and at mid-day, on the following day, she died, her temperature having in the meantime reached 106°.

But for the examination of the organs after death her dying would have been attributed to renal congestion.

At the *post mortem* examination the left lung and the liver were found to be quite healthy. The right lung was in a state of grey hepatization, and the kidneys and spleen were intensely congested. The brain was only slightly congested, but the whole of the arachnoid space was filled out with a semi-solid matter, which was found to be lowly organised lymph and pus. This was most marked on the convolutions at the upper aspect of the brain, gradually thinning off until the under surface of the brain was reached. At the pons and medulla some free pus was seen. The pia mater infiltrated with this matter was easily stripped from the surface of the brain, and without laceration of the brain substance. If there was any difference of intensity, there was more of the purulent lymph on the left side.

Opacities of the arachnoid and sub-arachnoid effusions are by no means rare in the cases which come on the *post mortem* examination table of a large asylum, where examinations are the rule and not the exception; but with

an experience extending over nearly a thousand examinations, I have never before met with such a condition as that I have briefly stated above.

The older writers—Prichard, Spurzheim, Noble and others—do not seem to have recognised such a condition, and even more modern writers, such as Sankey, whose work is based entirely on personal observations, Feuchtersleben and Griesinger do not mention such a condition. The most modern writers, in which I include Ross, Althaus and Long Fox, do refer to it. Ross even describes it as pneumonic metastasis, and this case may, I think, fairly be ranked under that class. It is more from its extreme rarity than from its especial interest that I have brought the case before you to-night. I was tempted to give it a name, which would make its position and nature more precise: hence the title of this paper.

(Read before the Bristol Medico-Chirurgical Society, May 9th, 1883.)

CYSTIC NEUROMA OF THE POSTERIOR TIBIAL NERVE.

By J. FENTON EVANS, M.B., House Physician, Bristol Royal Infirmary.

Neuromata were first described by Cheselden in 1740, his attention being directed to the cystic variety, although an uncommon form.

According to Paget there are four forms of neuroma (excluding from consideration the somewhat doubtful tumour of nerves, where the true nerve elements are hypertrophied), *i.e.*, cystic, fibrous, fibro-cystic and cancerous, the latter occurring least frequently, and stated by some writers never to originate in nerve trunks, but to invade them from neighbouring structures, "the true neuroma being never malignant."

Neuromata may be idiopathic or traumatic, single or multiple, when traumatic as a rule single. They are more commonly found on cerebro-spinal nerves than on sympathetic.

To the traumatic class belong the fibrous enlargements on the ends of nerves in stumps, often the source of suffering, but as frequently painless, and occurring at some distance from the cicatrix; cases are also recorded of tumours arising in the course of an individual nerve as the result of injury, and producing great pain both above and below the seat of the new fibrous growth, whereas with the single idiopathic tumour the pain is confined to the distribution of the nerve on which it exists.

The idiopathic neuromata may be single or multiple; when single generally very painful, when numerous often undiscovered before death.

I was fortunate enough to meet with a specimen of multiple cystic neuroma on the posterior tibial nerve of a subject in our dissecting room last winter.

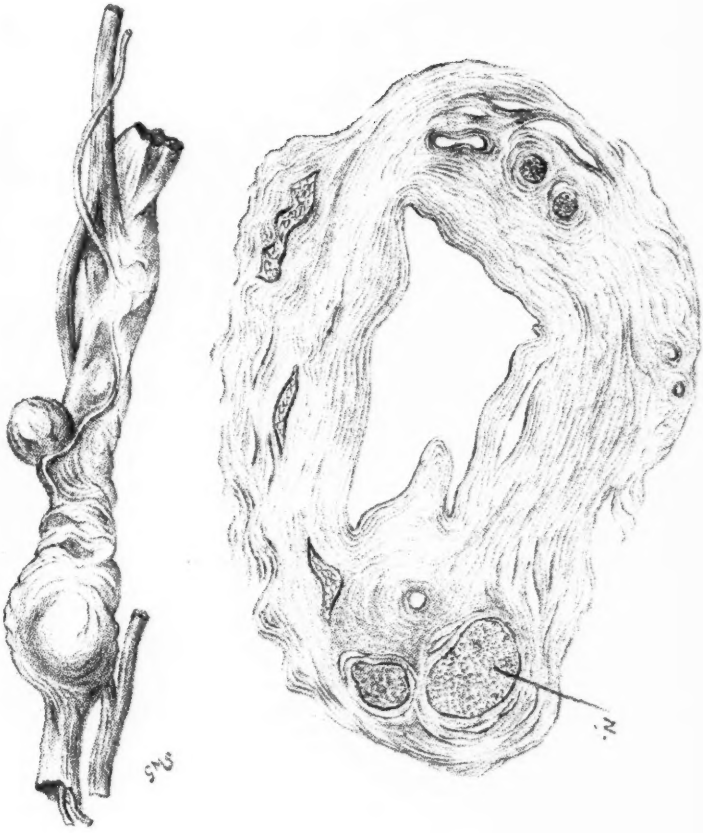
On removing the gastrocnemius and soleus muscles with the deep fascia a chain of blueish glistening bodies was to be seen running continuously in the course of the posterior tibial nerve, lobulated and varying in size from a pea to a hazel nut, commencing above in the popliteal space and ending below at the ankle joint, with which the lowest cysts appeared to communicate (Pl. V.).

The nerve increased in size, split up into several bands, some entering the growth at the upper end and some at various points in its course, one trunk running down to the foot independently.

On section the cavities have no connection with each other, and contain a clear albuminous jelly.

Under the microscope the cyst wall is seen to consist

Plate V.



Cystic neuroma of Posterior Tibial Nerve.

of white fibrous tissue, the fibres in many places undergoing mucous degeneration. It seems possible that the formation of the cyst cavity and contents may have been due to a mucous degeneration of the fibres, a fibrous tumour being first formed and gradually breaking down in this manner. The nerve fibres run in two or more bundles through the wall on either side, and appear healthy, the white substance of Schwann not diminished, the axis cylinders staining well.

Mr. Munro Smith has kindly made the drawings for me.

THREE CASES OF PUERPERAL CONVULSIONS TREATED BY VENESECTION.

By J. FULLER, M.K.Q.C.P., Irel., Long Ashton.

I.—Mrs. S., age 26, was delivered of her first child on May 26th, at 6 p.m., and was attended by Mr. Ormerod, of Westbury. She had a natural labour, and there was nothing to indicate that convulsions might occur; she was seen by him about 5 p.m. the next evening, and appeared to be doing well. About 6.30 the same evening a messenger came to ask him to come and see her again, as she had had three fits since he left her. He kindly asked me to accompany him. On arrival we found she had had two more fits since the messenger started, but was then free from them. Her face was slightly puffed, and, on drawing off some of her urine, it was found to be highly albuminous. Her pulse was full and strong. She was given an enema of turpentine, and, there being no return of the convulsions, we left. We had not been home more than two hours when we were sent for again, as the convulsions had returned. Mr. Ormerod having an engagement asked

me to go and see her, and suggested that if other means failed I should bleed her. On my arrival I found her unconscious; she had had two fits since we left her, but had not recovered consciousness from the last; her breathing was slow and laboured, pulse full and slow, pupils dilated and insensible. I gave her an injection of 40 grains of chloral and the same of bromide of potassium, which had no effect. She continued having the fits every half hour, but did not return to consciousness between them. As I had waited about five hours and there was no prospect of improvement I took 35 oz. of blood rapidly from her arm, she appeared quiet for three-quarters of an hour, but did not regain consciousness. The fits returning I removed the bandage and took 10 oz. more. The fits ceased and she became conscious within an hour. There was no return of them. Next day I found her doing well, but complaining of pain in her left shoulder. Examination revealed dislocation of the humerus, downwards into the axilla, done by muscular action alone. This Mr. Ormerod reduced. She made a good recovery.

II.—The second occurred in my own practice at Long Ashton. On March 2nd, 1882, I was sent for to attend Mrs. H., who expected to be confined of her third child. On arrival I found that labour had commenced at 7 a.m.; the pains had been feeble and irregular until 8 p.m. when they became more severe. The nurse informed me that the patient was convulsed with each of the last five pains, and remained unconscious for some short time after the pains had left her. There was then an interval of some twenty minutes between each pain. There was no swelling of the face, but the hands were somewhat swollen; no albumen in the urine; she had a fair pulse. On examination I found the os about the size of a five-

shilling piece, hard and undilatable, the head presenting, a pain then coming on the woman was again convulsed. The nurse remarked that it was worse than the previous ones, as it lasted longer, and the return to consciousness was not so complete as before. The pains kept increasing in frequency, and with them the convulsions. There was now no return to consciousness between the attacks. I tried the inhalation of chloroform, which certainly diminished the violence of the attacks, but did not quite stop them, and when I left off using it they returned as violent as ever. As I had now waited more than three hours, and though the pains were very strong, there was no perceptible dilatation of the os, I began to get anxious about her, and decided on trying venesection. I took 30 oz. of blood rapidly from her arm, the convulsions ceased almost immediately, the os became soft and dilatable, and in less than an hour I was able to deliver with the long forceps. The child was dead, but the mother made a good recovery.

III.—The third case, Mary G., unmarried, was delivered of her second child on August 8th, 1882, at 11 a.m. She had, I understood, a natural labour. Twelve hours after she was seized with convulsions, which she continued to have with very slight intermissions until four next morning, when I was sent for. She was unconscious when I arrived, and her mother told me she had been like that for an hour, and she had had three fits in that time; her face and legs were œdematous, urine albuminous, pupils dilated, pulse rather weak. As they had not informed me of the nature of the case before I started I had nothing with me to give her. Being some distance from home I did not like to leave her. Having no one to send for anything, the fits continuing, though

not violent, and consciousness not returning, I decided on bleeding, and took, I should say, from 25 to 30 oz. (I had nothing to measure it with) of blood from her; the fits entirely ceased, though she did not become quite conscious for some hours after. She made a somewhat slow recovery. As she had the swelling of the face and legs prior to her first confinement, but no convulsions, it did not give her any uneasiness.

In treating these cases I held these points of pre-eminent importance—to take away plenty of blood and to take it rapidly.

ULCERATIVE ENDOCARDITIS OF THE TRICUSPID VALVE. Extensive Fibrinous Deposits. By J. E. SHAW, M.B.

E. P., æt. 23, single woman, worker in a stay factory, was admitted to the Bristol Infirmary, January 10th, 1883, complaining of rheumatic pains and weakness.

Previous History.—Remembered having no previous illnesses. Five months ago, after having got wet several times in going to work and then sitting in her damp clothes, she suffered from pains and swelling in her hands, elbows and shoulders, and was hardly able to walk to her work. Seeking advice she was told that she had rheumatism, was given some medicine, and ordered to stay in bed, but getting no better, in the course of a few days she got up and went to work again, after which the complaint gradually got better. A few weeks ago she was in bed again with her ankles and knees swollen and painful, but at the end of a week she was able to get up and go out, and remained fairly well until four days before admission, when she was taken ill again with pain in her shoulders,

back and stomach, lost her appetite and had shivering fits; she then took to bed again and remained there until admission to the Infirmary.

Family History.—Her mother was "consumptive" and had dropsy; several of her brothers and sisters were said to have died of consumption.

State on admission.—She presented the appearance of a fairly nourished but very anæmic young woman; skin sallow and rather moist, no swelling in any of the joints. *Temperature*, 99°; *pulse*, 136; *respirations*, 30, with obvious subjective dyspnœa. No abnormal physical signs to be found in connection with the *lungs*. The *heart's* impulse was seen to be diffused over a considerable area on a horizontal line with, and internal to the nipple, the apex-beat being very slightly marked. On auscultation there was a bruit loudest over the body of the heart, heard also at the apex, apparently systolic in time, of a blowing character, and the first sound seemed to be reduplicated; there was no independent murmur generated at the base. Very marked pulsation was visible in the carotid arteries, but there was no pulsation present in the jugular veins. *Tongue* large, pale and moist.

The progress of the case during the next month presented no fresh feature of importance. She suffered much from nausea, vomiting and flatulence, especially after mixtures containing digitalis and aconite, which were given with the purpose of reducing the rapidity of the heart's action. She had a troublesome dry cough, without expectoration, and considerable shortness of breath even without any exertion. Her temperature ran the course of an irregular intermittent, and rigors occurred on the 11th and 13th of January, and on the 9th and 12th of February.

February 15th.—Some œdema of feet and ankles appeared to-day for the first time.

February 17th.—A rigor between 4 p.m. and 8 p.m.

February 18th.—Some slight harshness of breathing detected below the right clavicle, and occasional sibilus is to be heard over the lung lower down in front. Her cough is very loud, barking and frequent, attended only by an exceedingly scanty expectoration of clear frothy mucus, with which there has never been any hæmoptysis. Has been complaining of rheumatic pains in her shoulders again this week. Œdema of feet and ankles slightly increased, and there is now a small quantity of fluid in the peritoneal cavity. The liver is symmetrically enlarged, prominent, smooth, tender to palpation; the lower border is about an inch and a half above the level of the umbilicus, while the upper border reaches to the level of the xiphoid cartilage. In the epigastrium there is very strong pulsation, which is communicated to the liver. A well marked systolic murmur is heard loudest at the xiphoid cartilage, though it is diffused over a considerable area, both to the right and left of the mid-sternal line, but more to the latter than to the former; a systolic murmur is also faintly audible at the inferior angle of the left scapula. No venous regurgitation or distension above the valves in the external jugular veins at the root of the neck; there is considerable dyspnœa with tendency to faintness, and pain on coughing in the left side and chest is much complained of. The various remedies—codeia, hydrobromic acid, henbane, &c., which had been employed to allay the violence of the cough had quite failed to do so, but had increased the tendency to vomit. She was therefore placed upon a simple mixture of hydrocyanic acid and cardamoms, with a chloral draught at night when necessary. *Pulse*, 120.

February 21st.—Œdema of feet and legs rather in-

creasing; *urine* contains no albumen but a great excess of uric acid. *Pulse*, 128.

February 22nd.—*Urine*, sp. gr. 1015, no albumen; sleeps better since she had the sleeping draught. Œdema of feet and ankles rather less. Has no pain in chest, but cough is extremely troublesome. Is decidedly weaker in herself. *Pulse*, 122.

February 26th.—A good deal of fluid in peritoneum; liver is not quite so tender to touch and reaches to about two inches above umbilical level. On auscultating the heart a cantering rythm is heard as if composed of a reduplicated first sound and one second sound; there is no murmur generated at the valves at the base but a loud murmur is still audible over the right ventricle, and the apparent reduplication of the first sound was probably a short presystolic murmur which could not be distinctly recognised as such on account of the rapidity of the heart's action. Considerable œdema of feet and ankles. She had rigors again last night, *without* elevation of temperature, followed by sweating. *Urine*, sp. gr. 1015; smoky, a trace of blood present, and albumen for the first time one-twelfth. The occurrence of blood in the urine, without *material* diminution in the quantity excreted, I presumed to be due to an embolic infarct having occurred in one kidney. I was therefore led to change the opinion I had hitherto held, that the endocarditic process was situated in the right chambers of the heart, for the view that it affected the left chambers and valves, and that the pulmonary incompetence, though so emphatically marked by murmur, was simply due to the ordinary mechanical dilatation secondary to lesions of obstruction and incompetence in the mitral valve. *Pulse*, 120.

February 27th.—At 3 p.m. yesterday, when sitting up

in bed talking to a friend, she began coughing very violently, soon after which she vomited and felt great pain and fluttering at the heart, causing acute suffering, dyspnœa and cyanosis; she became insensible, and remained so for half an hour; nitrite of amyl, which was administered, did not materially relieve the anginous pain. Complains to-day of feeling very weak. *Pulse*, 100; feeble, irregular and very compressible. *Urine* acid, sp. gr. 1015, blood present, albumen one-eighth, no casts.

February 28th.—Feels somewhat better, but has had yesterday and to-day a sensation of "fluttering at the heart" several times, with attacks of anginous pain also. Did not sleep well last night. A well marked thrill is to be felt over the right ventricle, apparently presystolic in point of time, but owing to the rapidity and irregularity of the heart's action it was impossible to determine with precision. *Pulse*, 100; weak, compressible and irregular. *Tongue* large, moist and clean. *Urine* acid, sp. gr. 1016; rather more blood present, albumen one-sixth, no casts. Digitalis was tried again in ♏v. doses of tincture combined with chloroform and ammonia, and belladonna ointment was applied to the left side to relieve the pain felt there in coughing.

March 1st.—The mixture containing digitalis ordered yesterday induced vomiting. As the urine was plentiful in quantity and the absence of casts from the secretion led me to believe that the hæmaturia was not of an acute inflammatory nature pills containing opium and digitalis, gr. ½ each, were ordered every four hours, as the heart's action was weak and rapid, and she was suffering from great uneasiness. The intellectual faculties were unimpaired. *Pulse*, 108.

March 2nd.—Except for a slight diminution in quantity

of urine and slight increase of albumen, she remained in much the same condition. *Pulse*, 100.

March 3rd.—No urine having been passed this morning the pills were stopped, and pulv. jalapæ co. 30 grs., ordered. At time of visit she was quite sensible but said she felt very sleepy, and unless roused, paid no attention to what was going on around her. The rapidity of the heart's action having considerably diminished we could observe with distinctness the perfect presystolic thrill over the right ventricle; the murmurs had almost disappeared, but the cantering rythm of the heart-sounds was very pronounced, produced, as it seemed, by a double first sound and a single second sound. *Pulse*, 80.

In the evening she died from failure of the heart's action, the temperature before death falling to 96°.

Autopsy performed twenty hours after death. Much œdema of lower extremities and vulva. *Thorax* only allowed to be opened. A pint or more of fluid in the left pleura. Both lungs decidedly emphysematous, especially at the upper borders and apices; much œdema also of the vesicular structure. In the left lung there were four embolic infarcts, two at the base, one near the root and one at the apex; none of these seemed very recent, being partially decolorised, firm, and presenting no appearances of suppuration in themselves, nor was there inflammation of the tissues around them. In the right lung there was one recent infarct situated on the anterior edge.

The *pericardium* contained about half a pint of clear fluid; there was no lymph or other sign of pericarditis.

The *heart* weighed 14 oz., the right ventricle was much distended. On laying open the right auricle and removing the coloured clot it contained there was seen

protruding from below through the tricuspid orifice a rounded white body projecting into the cavity of the auricle, about the size of a small walnut, smooth on the surface but somewhat lobulated. On laying open the right ventricle from its posterior aspect (Pl. VI.) and clearing away the contained clot, this body was seen to be springing from a chorda tendinea uniting the posterior musculus papillaris to the anterior flap of the tricuspid valve, upon which, as well as upon other chordæ tendineæ, were numerous similar firm white "vegetations" resembling in shape and size white currants. The septal flap of the valve was mostly destroyed by the ulcerative process, only ragged strips of it being left attached to its insertion. The inferior flap was unaffected by the process. From the endocardial lining of the front of the ventricle itself in one place there was a small "vegetation" developed. The ventricle was completely filled with "passive" clot, dark-red and soft in the centre, becoming paler and firmer towards the endocardium, against which it was colourless, tough and fibrillated. It however stripped off quite cleanly and easily from the "active" clot of the "vegetations." The endocardium of the right auricle was healthy, as also were the endo-

EXPLANATION OF DRAWING.

The right Ventricle of the Heart laid open from behind:

a. The auriculo-ventricular orifice,—"a" placed upon the shrunken anterior flap.

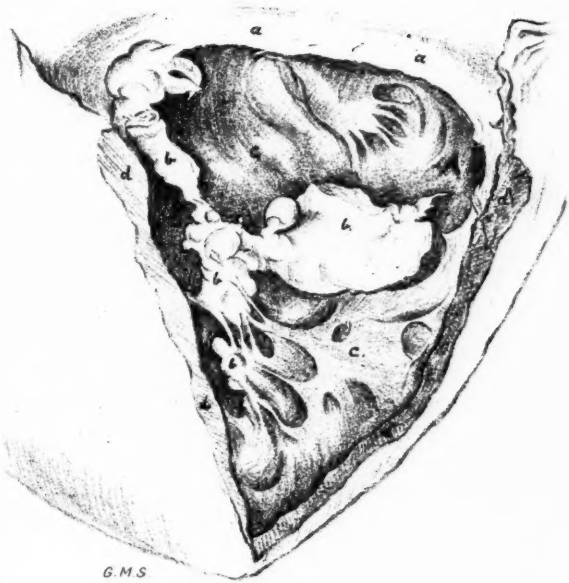
b. The fibrinous "vegetations" developed from and upon one chorda tendinea.

c. The internal surface of the ventricle.

d. The edges of the wall of the ventricle where divided.

N.B.—The drawing was made from the specimen when it had been preserved in spirit some weeks. The relative size of the "vegetations" is therefore considerably diminished, due to the shrinking they had undergone from the action of the spirit.

Plate VI.



Ulcerative Endocarditis. Fibrinous Deposits.

cardium of the left auricle and ventricle, and the pulmonary, mitral and aortic valves.

The kidneys, liver and spleen were removed by rupturing the diaphragm. The *liver* presented a typically "nutmeg" condition. Into the substance of the cortex of the *kidneys* were numerous punctiform hemorrhages—the source of the blood in the urine during the latter days of life. *Spleen* was enlarged to nearly twice the normal size and was firm in texture. In other respects these viscera were normal. No infarcts existed in any organ besides the lungs. The brain and remaining viscera were not examined. There was no purpuric or other eruption observed anywhere during life or after death except the before mentioned hemorrhages into the cortex of the kidneys.

Remarks.—This case is of interest as being a very good example of ulcerative endocarditis of the septicæmic type, and possesses a special interest as an example of acute endocarditis affecting one of the right chambers of the heart. This, when it occurs in adult life, is much more frequently of the "ulcerative" variety than of the "verrucose"; and "vegetations" springing from parts of the endocardium other than that covering the valve-flaps, such as existed here, seem to be found in the ulcerative variety of endocarditis only.

We had here the most frequent causal (or concomitant) malady—rheumatism. The lesions in the tricuspid valve were all recent, so that in this instance the acute ulcerative process was not engrafted upon a chronic endocarditis, or its consequences, as is most usually the case.

GASTROSTOMY FOR MALIGNANT STRICTURE OF THE ÆSOPHAGUS. HYDATID CYST OF LIVER. By the EDITOR.

R. C., aged 53, a shopkeeper, was admitted to the Bristol Infirmary, under the care of Dr. Shingleton Smith, on October 6th, 1881, complaining of difficulty in swallowing food, great weakness, shortness of breath on exertion, and swelling of the ankles and legs.

His *history* was fairly good. There was no predisposition to hereditary complaints, and no evidence of syphilis. He had been a butler and accustomed to partake freely of stimulants, but seldom to great excess. He had had two or three mild attacks of gout, and three years previously he had dropsy of the lower extremities. Seven years ago he had occasional attacks of violent pain in the pit of the stomach, followed by profuse vomiting. With these exceptions he had enjoyed very good health.

He first noticed that he could not easily swallow solids two months before admission. For a few weeks prior to admission he had lived entirely on liquid food, being unable to swallow the smallest bits of solid material. He had got very thin and weak, and his ankles had become much swollen.

On admission his symptoms were chiefly those of want of sufficient nourishment. He looked pale, thin and haggard, had great shortness of breath on walking even a few yards, and complained of a constant feeling of nausea which was much aggravated when he attempted to take food. Both ankles and legs were œdematous. There was a systolic murmur at the apex of the heart, but no

cardiac enlargement. Pulse weak, 60–70, occasionally intermitting. Arteries tortuous and hard; slight arcus senilis. The cutaneous veins on the chest, especially on the left side, were enlarged and full of dark blood. Urine was of normal specific gravity and reaction, no albumen. Weight, 9st. 8lb. He was put on iodide of potassium in increasing doses up to gr. 45 three times a day. In three weeks he had lost ten pounds in weight, and though his power of swallowing was improved, yet he was clearly losing ground.

On October 30th I was asked to see him. With some difficulty a No. 12 French catheter was passed into the stomach. The catheter was firmly gripped and appeared to traverse a stricture of some length. No tumour could be felt with the fingers, but the obstruction did not begin less than an inch below the larynx. The mucus in the eye of the catheter was examined microscopically, but no information was derived therefrom. Next day he had severe pain shooting up from the right side of the neck to the right eye and temple, and he said his right ear felt numbed. The difficulty in swallowing was also increased.

The pros and cons of the operation of gastrostomy were honestly put before him and he was left to elect for himself. In the meantime nutrient enemata were administered twice daily. He decided not to be operated upon, and left the Infirmary on November 19th.

On December 1st he appeared for re-admission saying he had got much worse and requesting operation, and he then came under my care. He was then in the last stage of exhaustion, weighing only 8st. 1lb., unable to support himself standing and looking very haggard. His legs were more œdematous, and the mitral murmur was somewhat more marked. Urine sp. gr. 1005, acid, no albumen.

He was put on nourishing liquid diet and enemata in preparation for operation, and in four days gained four and a half pounds in weight. The day before the operation his bowels were well moved by enema, and no other preparatory treatment was adopted.

The *operation* was performed antiseptically on December 13th. An incision an inch and a half in length along the edges of the eleventh and twelfth ribs and about a finger's breadth distance from them. On dividing the peritoneum the liver filled the wound, and went for nearly two inches to the left of it. A retractor was put under its thin margin and it was kept to one side during the rest of the operation by an assistant. (The cause of the liver being pushed so much to the left side was found after death to be the presence of a large hydatid cyst on the upper surface of the right lobe). The stomach was found high up under the diaphragm contracted to a size not larger than the colon, very thin walled and quite empty. Some slight amount of force had to be used to get a portion of its wall into the wound. The portion of stomach selected for opening had reference rather to the least amount of dragging on its walls than to the best position physiologically, and this was found to be at a point nearer the lower than the upper margin and about three inches distant from the pylorus. The wall of the stomach was fixed to the margins of the wound by a thick continuous silver wire carried round each margin in the manner in which shoemakers stitch the sole to the upper of boots. It included skin, peritoneum and fibrous coat of stomach, and when the wires were pulled almost straight exact apposition of peritoneal surfaces was got. It was at first intended to use interrupted sutures, but it was clear that the traction on the stomach walls would try too much the

small grip which they would afford and also probably leave little openings between the peritoneal surfaces, and so the above plan was adopted. It was not easy of application, but was most efficient. An area of stomach wall about three-quarters of an inch long and half an inch broad appeared in the bottom of the wound.

The patient did very well after operation. The temperature on the morning after operation was 99.4, thereafter it continued normal till the seventh day. No sickness. The patient was fed on nutrient enemata of peptonised milk and beef juice and Slinger's capsules. On the evening of December 16th he began to regurgitate quantities of most offensive mucus, and this continued on the 17th. On this day the antiseptic dressings were removed and the stomach opened with a Syme's knife. A French gum elastic catheter was placed in the opening and three ounces of warm peptonised milk were introduced, aud this was repeated every four hours till next day. He then felt much better, and all regurgitation had ceased. His breath did not smell so offensively. Next day he had gained no ground however, and thereafter it became evident that his food did him no good, and he gradually sank, dying on the 23rd, ten days after operation.

At the *post mortem* examination the stomach was found well glued to the peritoneum round the incision by recent lymph, and the rest of the peritoneum was quite free from signs of inflammation. The aperture in the stomach was nearer to the pyloric than to the cardiac end of the stomach. There was found (what was not diagnosed during life) a globular hydatid cyst four inches in diameter, with thick walls, embedded in the upper portion of the right lobe of the liver, between it and the diaphragm. When the cyst was enucleated the right lobe was found to be atrophied

and the left to be hypertrophied, so that the former weighed only 1lb. 3oz. and the left exactly double,—2lbs. 6oz. The margin of the left lobe was very thin and much spread out, and this was the reason why the liver was found to be so much in the way during the operation. And, in fact, part of the liver margin was embedded in the area of lymph exudation which surrounded the site of operation, and would, no doubt, have become permanently fixed there. The stricture in the æsophagus was of typical epitheliomatous growth, about an inch long, tortuous, and in no part of larger calibre than a No. 6 catheter. The bowels were full of undigested food. All the other organs were healthy.

Remarks.—This is one more case in which the operation was too long delayed. It was only at the urgent desire of the patient that it was performed at all. Though it was done almost as a forlorn hope, yet it showed with how slight constitutional disturbance this operation may be performed even when the patient is in the last stage of exhaustion. The presence of a hydatid cyst in the liver, pushing it over to the left side and causing enlargement of the left lobe of the liver and so rendering the operation more difficult than usual, was a most unusual and quite unexpected complication.

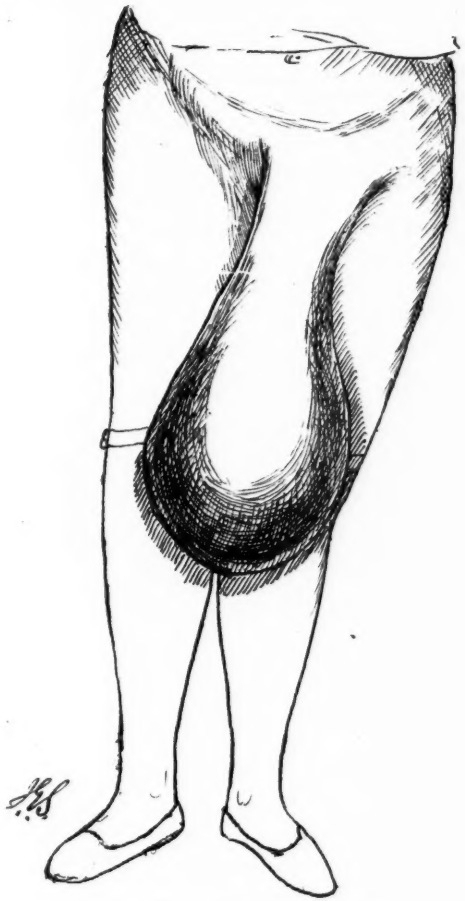
RECURRENT PENDULOUS FATTY TUMOUR OF THIGH. By the EDITOR.

J. I., æt. 66, a shoemaker in Cardiff, was admitted to the Bristol Royal Infirmary on April 21st, 1883, with a pendulous fatty tumour springing from the upper and inner aspect of the left thigh. Ten years previously a tumour of the same nature had been removed from the

Plate VII.

Recurrent Pendulous Fatty Tumour

Plate VIII.



Pendulous Fatty Tumour.

same situation in the Infirmary. Two years after this operation the tumour began to grow again under the scar, and had gradually increased up to date, becoming in the last eighteen months pendulous. The surface on the under and posterior aspect had begun to ulcerate two months prior to admission. The situation and size are shown in the accompanying plate, traced from a photograph. (Pl. VII.) It was removed, and the wound healed by first intention.

Remarks.—It seems extraordinary that the only other case of recurrent pendulous fatty tumour which I can find recorded should have been of nearly the same size and *in almost exactly the same situation.* The case is described by Mr. Curling in *Path. Trans.*, vol. xviii., p. 86.

"In May, 1863, I exhibited at a meeting of the society a large lobulated fatty tumour weighing upwards of a pound, which I had removed in that month from the left side of the scrotum, lower part of the abdomen and inner part of the left thigh of a gentleman who had undergone three previous operations; the first by Mr. Lawrence, in 1845; the others by myself, for fatty tumours in the same part of the body. About two years after this last operation the patient called and showed me a pendulous tumour, about the size of a hen's egg, growing from the inner part of the thigh near the cruro-scrotal fold, and another swelling beneath the old cicatrix near the pubes. A fifth operation was performed on May 29th, 1866. After removing the pendulous growth I found and excised a well-defined oval fatty tumour, the size of a hen's egg, embedded in the muscles of the thigh beneath the pectineus. . . . . The chief point of pathological interest is the persistent tendency to the formation of adipose growth on the site of the original tumour and in

the adjacent parts of the thigh. I know of no similar case of recurrent fatty tumour."

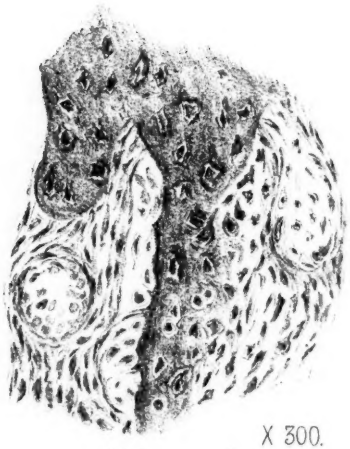
Report by Mr. De Morgan and Mr. Hulke on Mr. Curling's tumours:—"The specimens present for the most part the appearances met with in ordinary fatty tumours. There are, however, certain peculiarities in their mode of growth and in their structure. In place of being separated from the structure in which they are embedded by a sheath of connective tissue, so as to permit of their complete enucleation, or attached to them by a neck consisting of the same elements as the tumours themselves, they originate in a pedicle which has in all instances been cut through. This pedicle contains a large amount of delicate fibroid tissue, which towards its root is arranged in the form of bundles; these spread out and form at first small and then larger areolae in which the fat vesicles are deposited. . . . The constant occurrence of a peduncle, and the evidently active growth of connective tissue in this case, are in harmony with the recurrence of the tumours *in loco*."

In this connexion it will be interesting to note a case of pendulous fatty tumour which was operated upon in the Bristol Infirmary by Mr. Richard Smith in 1834. The patient was a woman aged 55, and *the tumour grew from the same situation.* It had been growing fourteen years and weighed six pounds. (Plate VIII.)

PRIMARY SCIRRHUS OF THE UPPER JAW IN A CHILD TWO YEARS OLD.

Hard cancer as a primary disease of the jaws is almost unknown. Mr. Pollock, in the new edition of *Holmes's System of Surgery*, writes:—"Scirrhus in its

Plate IX.



X 300.

J.G.S.

Primary Cancer of upper Jaw, in a Child.

onslaughts appears to disregard these regions; for though found as a secondary condition in bone, it has not fallen to our lot to notice it in the bones of the face: the experience of others confirms this observation." Heath, however, says in his work on *Diseases of the Jaws* that, though he has met with no specimen himself, he believes preparation 1059 E in the College of Surgeons' Museum, removed by Coates of Salisbury, to be one of scirrhus of the upper jaw.

On January 30th, 1883, Mr. Prichard, at the Bristol Royal Infirmary, removed from a girl two years old the right upper jaw for what at the time was believed to be medullary cancer. The tumour depressed the hard palate, pushed aside the nasal bones, and raised the floor of the orbit. The skin at the naso-orbital angle was red and discoloured, as if ulceration were about to take place. It had been growing for so long a period as eighteen months. The wound healed by first intention, and the child was dismissed in a fortnight. It had recurred when the child was last seen.

Mr. Prichard kindly gave me the tumour to examine, and I believe it to be an undoubted case of primary scirrhus. Everywhere the appearance of the developed growth was that of hard cancer, and beautiful examples of the manner in which this growth invades bone were met with. A sketch of one of the portions is given opposite (Pl. IX.).

J. G. S.

CASE OF VERY LARGE MENINGOCELE.

This case is recorded on account of the large size to which the tumour grew without seriously affecting the health of the child. It lived till it was nearly a year

and a half old. The accompanying drawing is traced from a photograph (Pl. X.). The growth protruded from an opening in the occipital bone, and was covered partly by the skin of the neck and partly by the scalp.

CONGENITAL DEFORMITY OF RIGHT LEG AND LEFT HAND.

The accompanying drawing (Pl. XI.), traced from a photograph, is an example of a rare deformity. The patient was twenty years of age, and was treated for typhoid fever in the Bristol Infirmary in 1881. No other members of his family were deformed.

Plate X.

Meningocele.

Plate XI.

F.S.

Congenital Deformity of Right Leg and Left Hand.

Notes on Books.

Diseases of the Liver: with and without Jaundice. By Dr. GEORGE HARLEY, F.R.S. Pp. 1200. London: J. & A. Churchill, 1883.

We confess to have read this work with very mingled feelings—not without interest certainly—but with disappointment and some regret.

Dr. Harley is a man of pronounced opinions. He has a very strong belief in himself, and he lays down the law with an amount of dogmatism from which there is no escape, but which seems hardly wise in a physician of his experience.

It would be impossible for us in a brief review to give a comprehensive analysis of Dr. Harley's book. It is a large and pretentious volume, and at first sight the reader is rather appalled at the prospect of going through it from cover to cover, but the type is remarkably large, and the amount of matter in each page, is consequently not great.

Dr. Harley distinctly states that his book is specially intended for his medical brethren. Were it not for that statement we should have been disposed to think it was principally directed to catch the popular ear.

The author uses strong language. He says "that even in highly educated Germany scientific medicine is still in its infancy, while in England it may be said to be still in its long clothes." He fires a shot at Clinical Teachers in the Metropolitan Schools, who still lecture to their pupils on what they please to term "Functional Derangements of the Liver"—which he evidently does not believe in—and taunts them with the assertion that while they are pursuing what he terms a "pernicious system," they would repudiate with scorn the idea of prescribing for a palpitation of the heart, a bronchial expectoration or purulent urine under the title of functional disease of the Heart, Lungs, or Kidneys.

We would only remark that an eminent and distinguished Physician and Clinical Teacher, not long deceased, whose experience of Liver Disease, both in India and at home, must at least

have been equal to Dr. Harley's, taught that there *was* such a thing as Functional Derangement of the Liver, and taught it effectually.

On the vexed question of Jaundice from Suppression Dr. Harley is intolerant of opposition, and goes so far as to assert without mercy that he who doubts in its existence "cannot have the slightest pretence to the possession of a clear judgment," and that the theory "must for ever cease to be regarded either as a clinical or pathological myth." We venture to call this statement in question, in so far at all events that there are very strong arguments on the other side. There is absolutely no reliable evidence to show that bile exists already formed in the blood, not even in that of the portal vein. Cases are on record where almost the whole liver has been destroyed, leaving nothing but the capsule—by suppuration—without Jaundice, and the experiments of Mueller, Kunde and Moleschott are entirely opposed to the suppression theory of Jaundice.

The Jaundice from suppression which Dr. Harley believes in is a very different thing from the Hæmatogenous Cholæmia, the result of disintegration of blood corpuscles manifested under such conditions as Pyæmia, Yellow Fever, Acute Yellow Atrophy and Snake Bite.

It is a pity that a work, which certainly possesses some merits, should be defaced with faults quite unworthy of the author's standing and position as a physician of experience. What for example can be more full of clap-trap than his chapter on Dry Champagne, upon which beverage he vents his wrath? Those who drink it, he says, "live in a fool's paradise and turn their stomachs into pickle jars." But he takes care to tell us that his own champagne is A 1, "as his friends very well know." Would that we could number ourselves among these happy mortals! But why deface a work on medical science with stuff of this kind?

The chapter on Contagious Jaundice is a remarkable one. This is to be, or ought to be, in Dr. Harley's opinion, the new name for that terrible disease, Yellow Fever; for he says "it is nothing more than an ordinary form of Jaundice from hepatic disease of a more than usually severe type."

That Yellow Fever and Acute Yellow Atrophy of the Liver have some features in common we do not deny. But that Yellow Fever, the most pestilential and destructive form of contagious fever known, is nothing more than an aggravated form of Jaundice is a statement which we cannot endorse. Jaundice is but a symptom of this Fever, one out of many of general and specific blood poisoning. The amount of discoloration of the skin bears no proportion to the gravity of the general

symptoms of Jaundice *per se* usually present, for the fæces still retain their bilious colour, and it has never been possible to demonstrate the presence of biliary acids in the blood of Yellow Fever patients. Surely the most tenable hypothesis of this disease is that a specific poison germ has been introduced into the circulation which produces solution and destruction of blood corpuscles, and a conversion of their hæmatine into bile pigment—in other words, Hæmatogenous Cholæmia.

We have no space to pursue the examination of Dr. Harley's work farther. We should be sorry to give an unfavourable impression of every part of it. Some chapters will repay the reader, especially that on Abscess of the Liver. But the value of the book is injured by conjectural theories advanced without sufficient scientific proof and by dogmatic assertions which offend the taste, while they do not convince the judgment.

Hence we fear that Dr. Harley's work will not add much to our knowledge of the particular subject or conduce greatly to his own reputation.

The Essentials of Bandaging. By BERKELEY HILL, M.B. Lond., F.R.C.S. Fifth Edition, pp. 341. London: Smith, Elder & Co., 1883.

The new edition of this favourite little work has been improved by special additions on Ophthalmoscopy by Mr. John Tweedy, and on Laryngoscopy by Dr. Vivian Poore; while Mr. Bailey has revised the instructions for administering Anæsthetics. There is an excellent description of Lister's method of dressing wounds; and in other respects the work is fairly well up to date. But it is not yet perfect. The author surely does not properly estimate the relative value of things, when among all the improvements in surgical apparatus and appliances brought in since the fourth edition was published, he should content himself with introducing "accounts of Thomas's splints, of Croft's plaster of Paris splints, and of Carr's splints;" and specially notify these additions in the preface.

The least satisfactory part of the work is that on Dislocations. Take "Backward Dislocation of the Elbow Joint" for instance. In reducing this dislocation "the patient sits on a chair on which the surgeon rests his foot, pressing his knee against the forearm at the elbow for a fulcrum; then, grasping the wrist with one hand, and steadying the arm with the other, he flexes the elbow to dislodge the coronoid process from the fossa at the back of the humerus; when this is done, the articulating surfaces

slip into place." Overlooking the bad grammar and the involved description, we doubt if this is trustworthy as a statement of fact. Not a word is said of what many surgeons consider the best of all methods for reducing this dislocation—that by over-extension. In the reduction of hip dislocations the student might conclude from the description in the text that the method by pulleys still held the prominent position it did twenty years ago. Reduction by manipulation may be successful only "when the patient is not very muscular, and the dislocation recent," he says.

The best part of the work is the long chapter on Surface-guides and Landmarks.

The lists of instruments given as necessary for the various operations are at least extensive. We doubt if many surgeons carry a bull's-eye lantern with them to perform an ovariotomy, or an Otis's coil refrigerator for a circumcision. And yet, in the operation for transfusion of blood, Aveling's apparatus is not even mentioned.

The Student's Manual of Venereal Diseases. By BERKELEY HILL and ARTHUR COOPER. Third Edition, pp. 109. London: Smith, Elder & Co., 1883.

This is an admirable manual, well arranged, clearly written, and free from controversial matter. It contains all that a student need know on the subjects of which it treats, and deserves to be, as it has been, very popular.

Auscultation and Percussion. By SAMUEL GEE, M.D. Third Edition, pp. 344. London: Smith, Elder & Co., 1883.

This work we consider to be one of the very best on the methods of physical examination of the chest. Great care has evidently been taken in the arrangement of the material and the description of the methods. Everything is elaborately tabulated and accurately headed; and the most perfect system and regularity obtains throughout. In the allotment of space special regard has been had to the practical value of the various methods, and those means of examination which are only of theoretical interest are not dwelt upon. The character of the style, a most important item in a work of this sort, is worthy of

all praise, being clear, concise and vigorous. We heartily recommend this work as a model of its kind, valuable equally to student and to practitioner.

A Guide to Therapeutics. By R. FARQUHARSON, M.P., M.D., F.R.C.P. Third Edition, pp. 373. London: Smith, Elder & Co., 1883.

The publication of three editions of this work within six years is sufficient testimony to the value which the profession puts upon it. The peculiarities which specially recommend it are its practical conciseness and the graphic manner in which the descriptive accounts of the actions of the various drugs are arranged. The Physiological and Therapeutical actions are arranged in parallel columns; and each column is subdivided into heads as the action of the drug on the various organs is described. The result is that the reason is appealed to and the memory assisted in a manner which must be peculiarly valuable to students.

Medical Extracts.

The First Nephro-lithotomy. (P)

The Way of Cutting for the Stone in the Kidneys, by Mr. Charles Bernard. *Phil. Trans.*, No. 223, pp. 333.

Mr. Hobson, who was Consul for the *English* at *Venice*, having been long afflicted with the Stone in the Kidney, was at length attacked with a Fit of that Duration and Violence, that it reduced him almost to Despair; and finding no relief from any Means that had been used, and being under the greatest Extremity of Pain imaginable, he addressed himself to *Dominicus de Marchettis*, a famed and experienced Physician at *Padua*, begging of him that he would be pleased to cut the Stone out of his Kidney, being persuaded that there remained no other Method capable of relieving him; adding, that he was not insensible of the Danger, but that Death itself was infinitely more eligible than a Life in that Misery. *Marchetti* seemed very desirous to have declined it, representing not only the extreme Hazard, but, as he feared, the Impracticableness of the Operation; that it was what he had never attempted, and that, to proceed to it, was in effect to destroy him. But *Marchetti* was at length prevailed upon, by his Importunity, to undertake it; and having prepared him as he thought proper, he began with his Knife, cutting gradually upon the Region of the Kidney affected, till the Blood disturbed the Operation, so that he could not finish it at that Attempt; wherefore dressing up the Wound till the next Day, he then repeated and accomplished it, by cutting into the Body of the Kidney, and taking thence two or three small Stones, he dressed it up again; from this Instant he was freed from the Severity of the Pain, and in a reasonable Time he was able to walk about his Chamber, having been in no Danger, either from a Flux of Blood or Fever. *Marchetti* continued to dress the Wound for a considerable Time, but was not able to close it up, it soon becoming fistulous, from the continual Flux of Urine through the *Sinus*. But being in all other Respects restored to his former Health and Vigour, and the Matter discharged being

little in Quantity, he took Leave of the Professor, and returned to *Venice* under the Care and Management of his Wife, who, one Morning as she was dressing the Sore, imagined she felt something hard and rugged as she wiped it; upon which, examining a little more carefully with her Bodkin, she found it to be a Stone of the Figure and Magnitude of a Date-stone; which being removed, he never after complained of the least Uneasiness in that Part. The Matter discharged was but little in Quantity, but always diluted with, and smelling strong of Urine. The Orifice would sometimes close for three or four Days together, and then the Matter would make its Way through the common Passages with the Urine, yet without any Difficulty or Pain. He applied nothing to the Orifice but a clean linnen Rag. He was able to perform all the Functions of Life, and to undergo any Fatigue, though upwards of 50 Years of Age.—*Mihles' Medical Essays.* 1745.

Free Removal of Mammary Cancer.

Mr. Mitchell Banks *(Liverpool Medico-Chirurgical Journal,* January, 1883) strongly recommends in every case of Cancer of the Breast a removal not only of the whole breast with its superimposed skin, but also of all the axillary glands, even though, to the eye and touch, they may not seem to be affected. He says:—"Surgeons, as a rule, do not remove cancers of the breast. They persuade their patients that they do, and they almost persuade themselves. But there is always that little bit which they leave behind, and which they fondly hope will not grow because it is such a little bit. Alas! that so little leaven should leaven the whole lump! If one turns to the surgery books of a hundred and fifty or two hundred years ago, the true method of removing a cancerous breast will be found. The breast was laid hold of with great pincers, and having been cut clean off the surface was seared with a red hot cautery. Against a proceeding so shocking to the eye modern taste revolted, and so, for many years, surgeons have been removing a little elliptical bit of skin including the nipple, and have been carefully dissecting out the subjacent mamma. Then the remaining skin all impregnated with cancer germs has been carefully laid down again and neatly stitched together, so that everything should heal up quickly. Hence removal of a cancerous breast after this fashion came to be regarded as a comparatively slight operation. Very few people died as an immediate result of it,—very few indeed. Unfortunately, at a little later period, they all died from want of a little more of it; so that, looked at from another point of view, it was the most useless of all operations, inasmuch as it never effected a cure. My present contention,

therefore, is for a return to the old plan of sweeping everything away and leaving a great hole, if you like."

He gives a synopsis of 46 cases, in 5 of which the breast alone was removed, while in 41 the breast was removed and the axillary glands cleared out.

6 cases proved fatal after operation;
11 had no reappearance of disease, and 10 died from it;
3 died from other causes under 2 years;
10 remained free from 2 to 10 years after operation;
5 " " 1 to 2 " "
9 done within last 12 months not reckoned;
1 lost sight of;
1 done for relief only.

A Tape-worm Trap.

In the *New York Medical Record* (March 31, 1883) is an account of an invention patented by Alphaeus Myers, M.D., of Logansport, Ind., in 1854, for the purpose of trapping tape-worms. The instrument is of gold an inch long and one-fourth of an inch in diameter, and has an elaborate interior economy. After being baited with a tempting morsel and attached to a string the trap is swallowed. The unwary worm pushes in its head, is caught and dragged out by the string. To give completeness to the record the number of the patent, 11,942, is given. The inventor found the plan successful!

Removal of Gall-bladder.

From a patient who, for six years, had suffered much from repeated attacks of biliary colic Dr. Langenbuch, in November, 1882, extirpated the gall-bladder. A T-shaped incision was made at the outer margin of the rectus muscle; the cystic duct was ligatured, the bile removed by aspiration, and the bladder cut away. The patient made a very rapid recovery, having got up in twelve days, and gained thirty pounds in weight in six weeks. At the end of four months he reported himself as being in perfect health.—*Berliner Klinische Wochenschrift.*

Gas-light from Fæces.

The problem of the utilisation of sewage has received a novel solution at the hands of an ingenious German. By the decomposition of human fæces a light-yielding gas is obtained, which, *after purification*, may be used for ordinary domestic purposes. *Der Technicker*, which gives an account of the process, says that a Breslau hotel has been successfully lighted by this means.

Rupture of the Aorta during Parturition.

The case was that of a woman of thirty-eight, apparently in good health, the os was dilating naturally, and the progress of labour seemed normal. Suddenly she was seized with convulsions and died collapsed. The forceps was applied and a living child delivered. At the autopsy a rupture of the aorta half an inch above the aortic valves was found. The pericardium was distended with blood.—*Centralblatt für Gynäkologie.*

Surgical Dilation of the Pylorus.

In an individual suffering from pyloric stenosis from a cicatrix, Professor Loreta of Bologna, after having made an incision in the epigastrium, and opened the stomach, mechanically dilated the pylorus. The result was most successful, since, on the seventh day, the phenomena caused by the stenosis had disappeared, and the patient was going on well in every way.—*London Medical Record.*

The Results of Resections of the Pylorus for Cancer,

as given by Rydygier, are as follows:—

Sixteen surgeons have operated upon 23 cases, all but two of which have been cancer. Of the last two operations one was performed by Rydygier in a case of stenosis, caused by round ulcer, which terminated successfully; and the other by Lanenstein, in a case of supposed cancerous tumour, which at the autopsy proved to be one of gangrene of the transverse colon. Of the 23 cases, 19 proved fatal; viz., 15 some hours after operation, 3 on the seventh or eight day, and 1 (Billroth's) four months after from relapse. Of the 4 recoveries, 1 belongs to Billroth (no relapse having occurred in six months), 1 to Wolfer (the patient seeming well at the end of a year), 1 to Czerny (seven months without a relapse), and 1 to Rydygier.—*Medical Times and Gazette.*

Cure of Squint without operation.

Dr. Boucheron maintains that cases of convergent strabismus are, in the early stages, before permanent contraction of the internal rectus has taken place, curable without operation. As convergence is caused by efforts of accommodation for near objects, paralysis of the accommodation by the constant use of mydriatics for two or three weeks will, in most cases, effect a cure. In eight out of nine cases of intermittent strabismus he obtained a cure in this way.—*Schmidt's Jahrbücher.*

Scarlet Fever and Cerebro-Spinal Meningitis in Horses.

A writer in *The New York Times* comments on the claim of Dr. J. W. Stickler to have discovered a preventive of scarlet fever in the equine virus. He adds: "I have long known that scarlet fever exists among horses, and that it has been recognised, especially by French veterinary surgeons, but could obtain no information about it in New York, although I was well satisfied that it lurked among one of the forms of so-called "pink-eye," and I have several years ago called attention to this fact. It is well known also that the great epidemic of cerebro-spinal meningitis among horses in 1871 was followed by the greatest outbreak of that disease among our citizens in 1872. There is some well established connection between the two. I have long thought that scarlet fever and cerebro-spinal meningitis were carried by grooms and hostlers to their own homes, and perhaps to those of their masters and patrons, but could not positively prove the facts, because so much concealment and prevarication is always covered around such matters arising from ignorance and surprise at such notions, more perhaps than from deceit.—*New York Medical Record.*

New Method of Treating Displacements of the Uterus.

For intractable cases of displacements of the uterus, chiefly retroversion, Dr. Alexander recommends an operation by drawing out the round ligaments through incisions made over the inguinal openings and fixing them there. He speaks of ten cases so operated on. Except in one case, where matters were made worse by the substitution of an anteversion for a retroflexion, good results were got in all. The operation is thus performed. The pubes being shaved, the pubic spine is felt with the finger, and an incision made upwards and outwards for two or three inches in length in the direction of the inguinal canal. The incisions are carried downwards till the vertical fibres that cross the external abdominal ring are exposed. These are cut through, and the terminations of the ligaments are seen bulging outwards as a reddish white tissue. This is raised by an aneurism needle, caught by the fingers and dragged out. On traction the thick round ligament appears, and by vaginal examination will be felt to draw the uterus along with it. This being done on both sides the ends of the ligaments are fixed by catgut ligatures at their point of exit from the abdominal wall. The uterus should be placed in position by the sound and not by traction on the ligaments. A pessary ought to be worn

for some weeks after operation.—*Liverpool Med. Chir. Journal*, January, 1883.

This ingenious operation was conceived and executed contemporaneously and independently by Dr. James A. Adams, Demonstrator of Anatomy in the Glasgow University, and by Dr. Alexander.

[The Editor performed this operation in a bad case of retroversion and retroflexion after every other means had failed. It kept the uterus in position and relieved the symptoms for a very few months; but matters gradually got as bad as ever. As this proceeding in no way changes the texture of the portions of round ligaments left, it seems not unnatural that traction should succeed in causing their elongation after, just as it did before, operation. Further reports are necessary to show that the good results have been permanent in Dr. Alexander's cases.]

PUBLICATIONS RECEIVED.—JULY, 1883.

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